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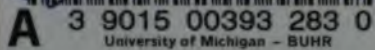
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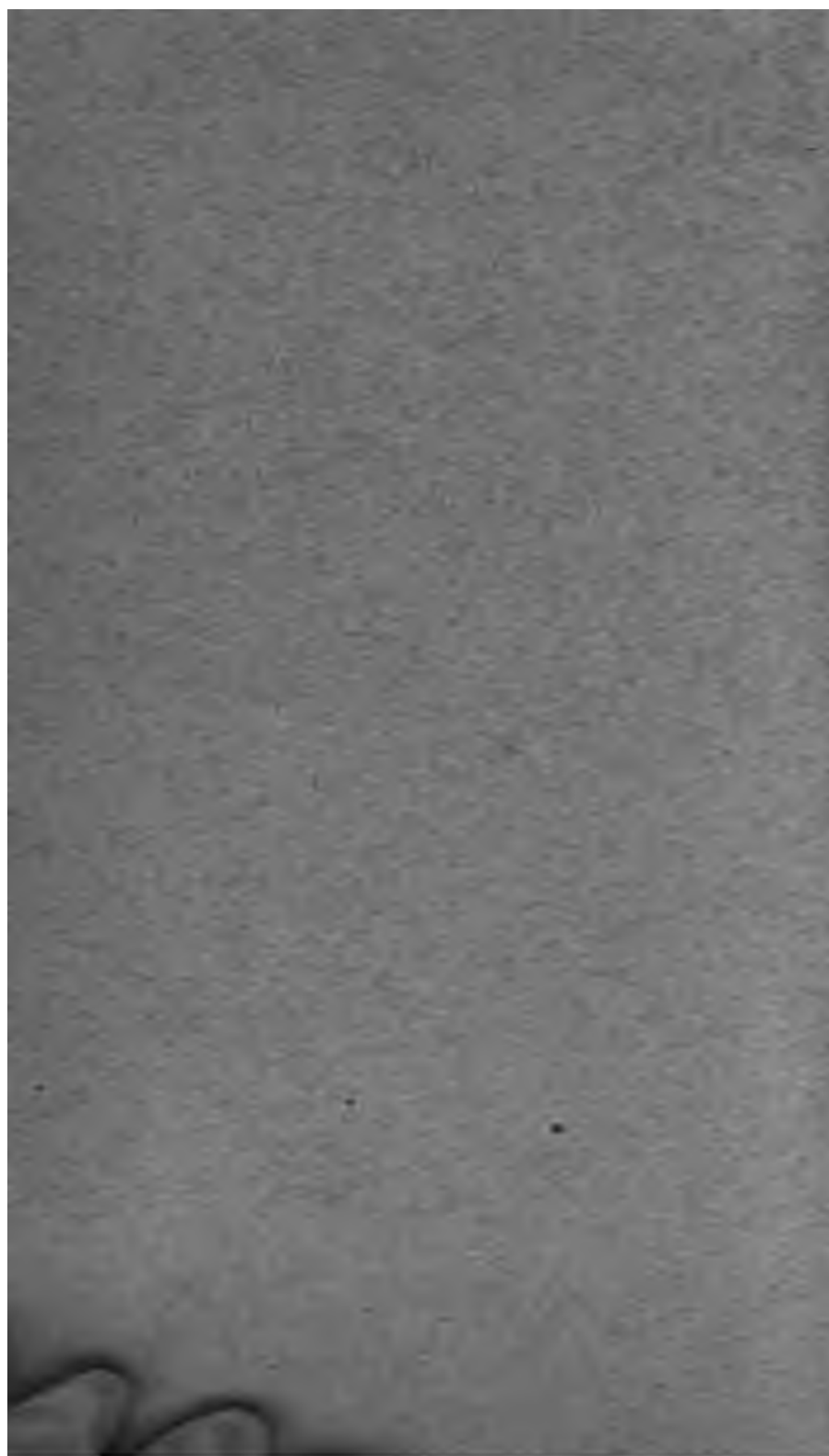
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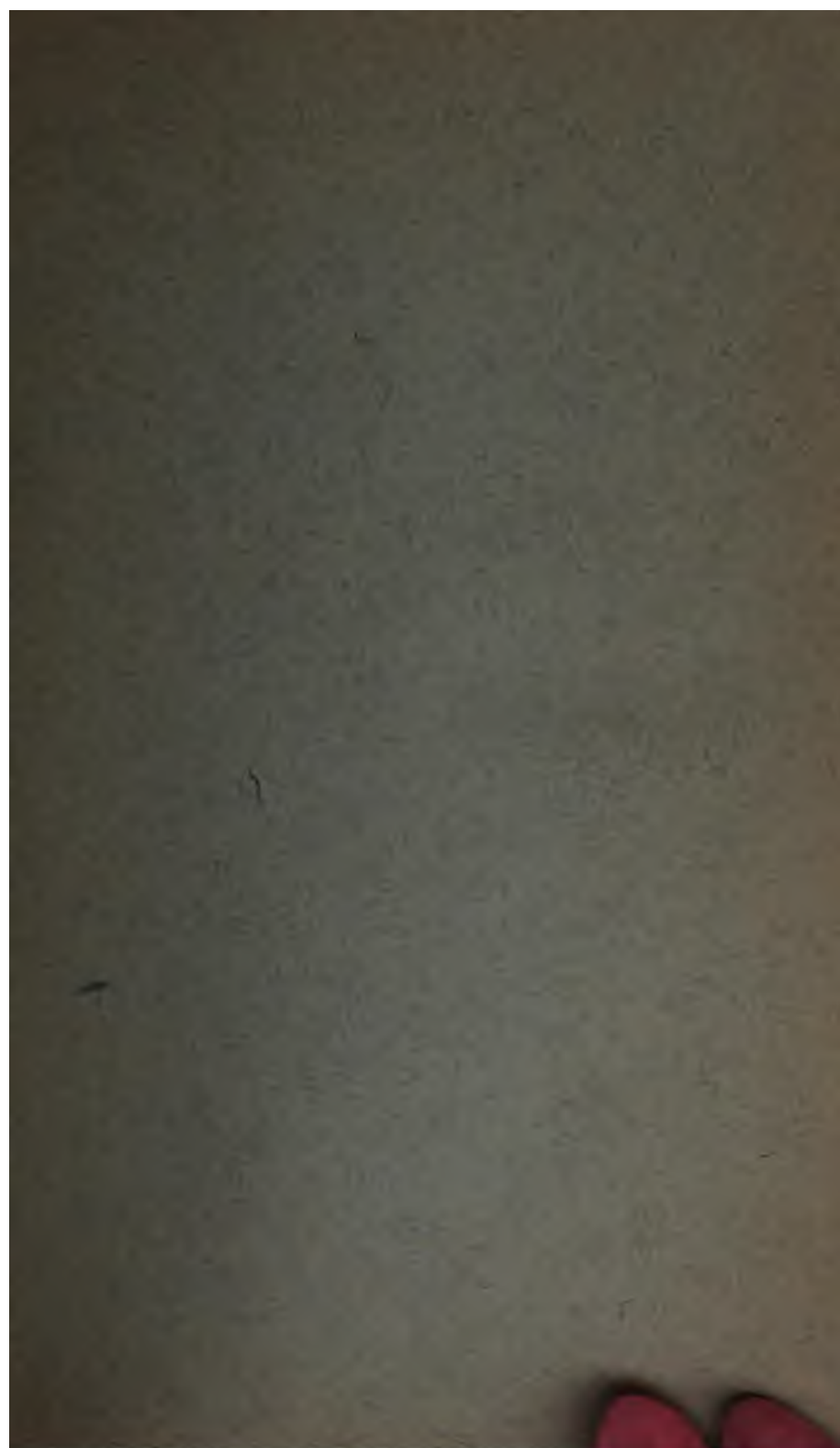
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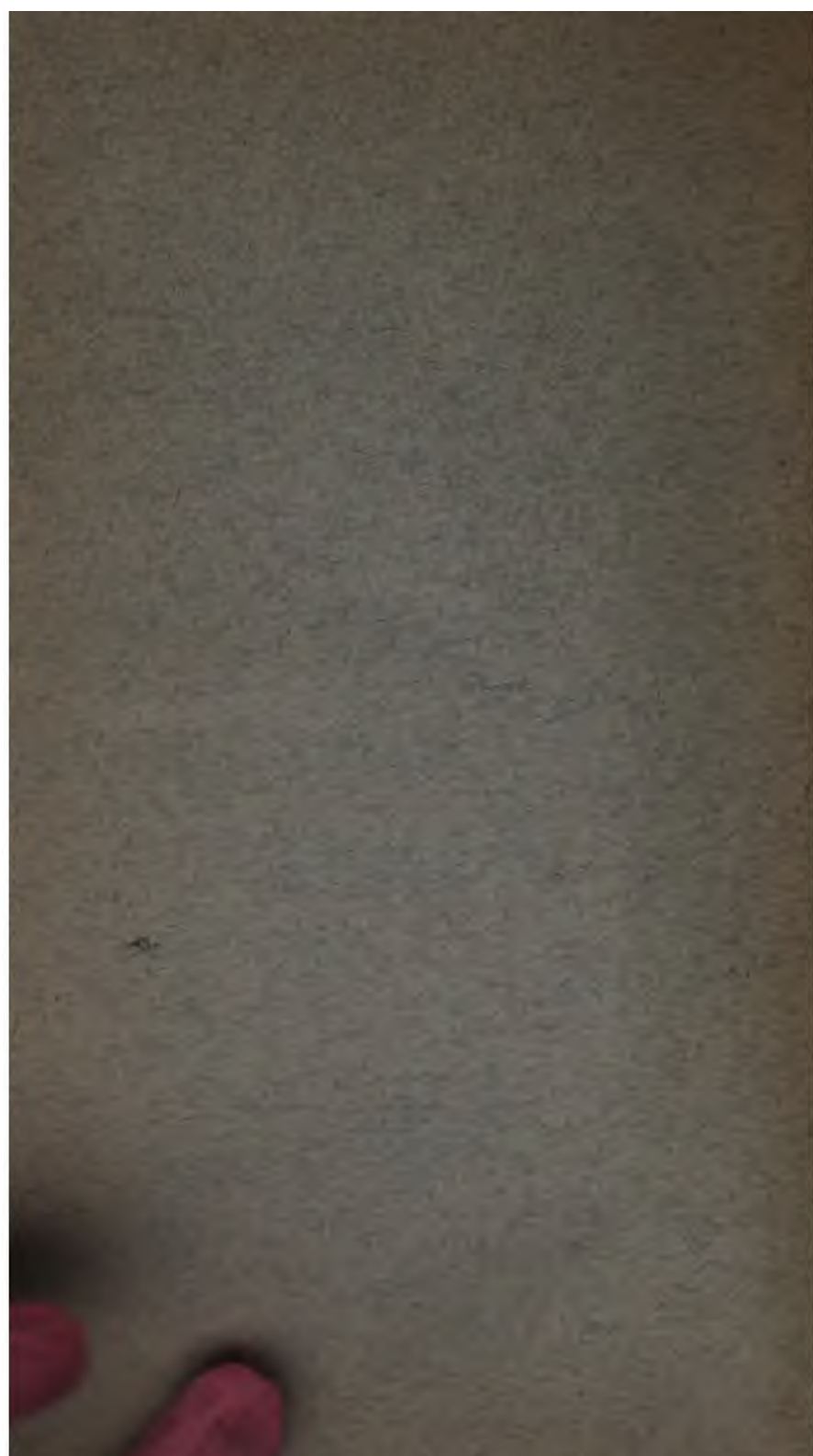
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HERMATHENA:

A SERIES OF PAPERS ON

LITERATURE, SCIENCE, AND PHILOSOPHY.

HERMATHENA,
A SERIES OF PAPERS ON
LITERATURE, SCIENCE, AND
PHILOSOPHY,

BY

Members of Trinity College, Dublin.

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ADDENDA ET CORRIGENDA.

- Page 263. The author finds that the transposition proposed by him in Propertius III. xv. is an old suggestion, and is actually the reading of Kuinoel's edition. The old editions of Propertius are too much neglected.
- Page 306, line 7, *dele* the words "following Jahn," and *substitute* the words "by his translation."
- Page 316, line 11, *add*, "'vultum osque' would be as near the MSS. as anything else."
- Page 364, to note on Att. v. 4, 2 *add* : *Consule* in Att. v. 4, 2, might be explained thus:—if the consul or president asked merely for a division on the question which he brought before the senate, some senator might call out *consule*, in the sense of *rem refer per sententias exquisitas*, "take the opinions all round in regular order." However, there is no evidence that *consule* was used to express this formal mode of debate, as distinguished from a decision by division (*discessio*).

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HERMATHENA.

BISHOP BERKELEY AND PROFESSOR FRASER.

PROFESSOR FRASER'S edition of Berkeley's works, with Introduction and Life, has helped to attract fresh attention to the doctrines of that great metaphysician. The extracts from the Bishop's Common-place Book, now published for the first time, are extremely interesting, as throwing light on the connexion and progress of Berkeley's doctrines in his own mind. The editor's introduction reproduces the substance (frequently the words) of his criticism on my work, *Sight and Touch*, a book which was professedly a refutation, not indeed of Berkeley, but of the received Theory of Vision, which is commonly called by his name. At the outset of my work I asserted, in opposition to all authority, that this theory was consistent with Berkeley's metaphysics, and with that system only. But although Berkeley himself had been led to it by metaphysical, and indeed as we shall see, by theological considerations, it was not so that he recommended it to the world; nor would it have been adopted, as it was, by philosophers of all schools, if it had not been believed to rest on an independent basis. My purpose did not require me to discuss the connexion of the theory with the Berke-

leian metaphysics, but I undertook to show, first, that the independent basis on which it was supposed to rest was unsound ; and, secondly, that the theory itself was in contradiction to facts and to ascertained psychological laws. With respect to the former point, I have received important assistance from my critic, who maintains, with great acuteness, that the theory is part and parcel of the Berkeleyian system of metaphysics. He has not a word to say in defence of the view that I controverted, but he thinks that, instead of attacking the recognised foundation of the theory, I ought to have discussed the principles which led Berkeley himself to it ; and which, though not explicitly put forward in proof, may be detected cropping up here and there in the course of his argument. Had I done this, however, I should have been justly charged with *ignoratio elenchi* : “ You undertake to refute a theory generally adopted, and you attack arguments and considerations which have not been admitted by any writer since Berkeley, and which Berkeley himself did not allege in proof of the theory.”

These principles have now found an advocate ; but he himself admits that he is the first since Berkeley. Everyone else, he asserts, has fallen into a “ portentous error ” respecting the true basis of the Theory. He thus cuts the ground very completely from under the appeal to authority which he had himself made. The judgment of Adam Smith and Sir W. Hamilton, that the Theory of Vision “ appears ” to be clearly demonstrated, carries some weight with it ; but it has already lost much of its force when we find that the word “ appears ” is emphatic, and that both these writers regard the “ whole question ” as “ thrown into doubt ” by the impossibility of reconciling the theory with the facts. And what weight does Professor Fraser expect us to allow it, when he tells us further that they did not understand the matter at all, but commended the wrong argument,

and ignored, or altogether rejected, the true basis of the theory?

The basis on which the Theory of Vision rests, according to Professor Fraser, is the specific distinction between visible and tangible extension, the psychological fact that the extension we feel is uncoloured and resistant, while that which we see is coloured and non-resistant. According to Berkeley, these two, although called by the same name, have no resemblance whatever—no more, *e.g.*, than the words of a language and their meaning. Now, since in the ordinary sense of the word extension, there is really but one extension, namely, that which is the subject-matter of geometry, it is obvious that one of these is not properly so called. According to Berkeley, tangible extension is extension proper; visible extension is merely a modification of colour and brightness; but a being only possessing sight could never attain the most elementary conceptions of geometry. The reader must therefore guard against supposing that the notion of visible extension is an imperfect notion of extension, and that of tangible extension a more perfect. They have, as above stated, no resemblance whatever. But it may fairly be asked: Why use the term “visible extension” at all, which is so suggestive of error? Berkeley replies that both these are called extension, just as the written word and the thing signified are both called by the same name. The analogy is imperfect. To test the matter, take Professor Fraser’s treatment of an argument of Sir W. Hamilton. The words in brackets are inserted by Professor Fraser: “Sir W. Hamilton contends . . . ‘that if a blind man had been able to form a conception of a [tangible?] square or globe by mere touch, he would, on first perceiving them by sight, be able to discriminate them from each other; for this supposes only that he had acquired the primary notions of a straight and a curved [tangible?] line,” etc. Now, let me

ask, suppose a critic to be commenting on a questionable statement about circles, would it be above a jest to suggest a doubt whether what was meant was the word "circles" or the figure? In fact, the ambiguity alleged has no existence whatever. Indeed, it is not even correct to say that the uttered word is the name or sign of the written word. The written word is primarily the sign of the spoken, which itself is the sign or name of the thing, and thus the written word is indirectly the name of the thing.

Whether correct or not, Berkeley's example is adduced to illustrate a supposed fact which does not exist. It is *not* the usage either of philosophers or of the vulgar to call the modifications of colour, etc., visible extension. True, men speak of extension, figure, etc., as visible. This may be explained in either of two ways. Either they erroneously suppose extension proper to be visible, or not regarding it as visible they apply the term to something which is visible but is not extension. Of these two suppositions the former is unhesitatingly admitted to be true by Berkeley himself, as by all his disciples. But it not only renders the second supposition superfluous, but excludes it. There is then no necessity to examine the explanation which Berkeley gives of the transference of the term extension from the thing to the sign, since no such transference takes place. Berkeley simply deviated from common use when he applied the term extension to something which has nothing in common with what is properly so called. Such use of language surely does not merit to be called philosophical distinction. Instead of clearing up an ambiguity, it creates one. That it would not be unfair to suppose that Berkeley did this deliberately is clear from a passage in his *Common-place Book*, in which he says: "I must not say the words 'thing,' etc., have been the cause of mistakes, but the not reflecting on their meaning, etc." Philosophers generally have not followed him in this particular, nor shall I follow

Professor Fraser in his revival of an ambiguity which tends only to mystify. I shall use the word extension, with all other writers, to signify that extension which is the subject-matter of geometry. The question may still remain, whether the sensible intuition of this is conveyed to us by sight only, by touch only, or by both.

The reader must be on his guard against the supposition that what Berkeley meant was that the same thing had two extensions. His view was, that what we see and what we feel are distinct things; so that, as Professor Fraser justly remarks, he might have said that we have four hands, two visible and two tangible. Nor is there any reason for limiting the number to four. We have also audible, "olefactable," gustable hands. We do not eat the same pudding that we see, nor do we see the same that we smell. The visible pudding is one thing, the tangible another, the digested pudding a third, and so on. When we think we possess one friend, or one father, we have, it appears, at least five friends and five fathers, perfectly distinct in existence, and not having even the slightest resemblance. Whether such a mode of speaking is scientifically more correct than the vulgar, or is calculated to advance scientific psychology, I shall not now inquire. But I may remind the reader that the sole ground on which we are asked to adopt it is the "psychological fact" above stated, namely, that the extension we feel is uncoloured and resistant, while what we see, which Professor Fraser also calls extension, is coloured and non-resistant. It is impossible, he repeatedly argues, to identify two such different things. This remark, which he considers perfectly unanswerable, appears to involve more than one fallacy. "Uncoloured" means not affecting sight so and so; "non-resistant" means not affecting touch so and so. Now how does Touch inform us that what is felt is uncoloured? or how does Sight inform us that what we see

is non-resistant? A deaf man and a blind man have been present, let us suppose, at an opera; the one is charmed with the acting of the *prima donna*, the other reports that she sang divinely. "How can we possibly identify," says our philosopher, "the silent actress with the immovable vocalist?" Does such an argument require a more serious answer, or does it cease to be trivial, and become profound, when, instead of two persons, we suppose that it is one man in perfect possession of his senses who insists that the vocalist was invisible and the actress inaudible? The argument, in fact, amounts to nothing more than this, that the sensations of colour and resistance are conveyed by distinct organs, or, in other words, are accompanied by a perception of different locality in that assemblage of local perceptions which we call our body, but which, according to Berkeley, is really several bodies. If the reader adopts the hypothesis that nothing exists except his own sensations, then he may admit this reasoning, but not otherwise. Much, no doubt, may be said for this hypothesis; but it is neither so evident nor so generally admitted as to be fairly assumed as a basis for a theory of vision. Nor is even this hypothesis sufficient for Berkeley's purpose. Because the idea of colour is accompanied by that of extension, and not by that of resistance, and the idea of resistance is accompanied by that of extension, and not by that of colour, does it follow that the idea of extension in the two cases cannot be the same? On any hypothesis but one, the fallacy of such reasoning is transparent. That hypothesis is that there is, in fact, no concomitance; that extension *is* either colour, or resistance, or both. And this is Berkeley's view. He holds that extension is merely the numerical aggregate of sensible minima; that is, in other words, he altogether eliminates extension as commonly understood. Just as he tells us that he differs from Locke in holding that succession of

ideas not merely measures, but constitutes time, so, from the same point of view, he holds that a series of sensible points not merely measures, but constitutes extension. If Professor Fraser is right in stating that this is the basis of Berkeley's Theory of Vision, then I claim the suffrages of those philosophers who refuse to accept such a conception of extension.

Professor Fraser, however, cannot mean that this is the ground on which Berkeley professedly bases his theory. This would make the Bishop guilty of reasoning in a circle. For in the *Principles of Human Knowledge* he expressly states that the Theory of Vision was written to obviate certain objections to his Idealism (*Principles*, sect. 42, *sqq.*) "Thirdly, it will be objected that we see things actually without or at a distance from us, and which, consequently, do not exist in the mind."... "That we should in truth see *external* space and bodies actually existing in it, some nearer, others further off, seems to carry with it some opposition to what hath been said, of their existing nowhere without the mind. The consideration of this difficulty it was that gave birth to my Essay towards a new Theory of Vision." The difficulty is this: If the Ideal theory be true, and things do not exist in space external to us, things cannot be perceived at a distance. But things are perceived at a distance in vision; therefore the Ideal theory is not true. To obviate this objection, Berkeley undertook to disprove the minor. But, according to his interpreter, his disproof of the minor was based on the denial of the conclusion. Berkeley, however, avoided this manifest fallacy, as a slight analysis of the Essay would show. In sect. 46 he says: "From what we have shown, it is a manifest consequence that the ideas of space, outness, and things placed at a distance, are not, strictly speaking, objects of sight; they are no otherwise perceived by sight than by the ear." The distinction of two extensions is given as an

inference from this. It is not till sect. 126 that he formulates the distinction in the decisive manner referred to by Professor Fraser; and indeed it is to this very section that the latter refers us, as that in which the true basis of the theory is to be found.

I conclude, then, that what Professor Fraser means is, that this was the basis on which the Theory of Vision rested in Berkeley's own conception of his system, and that Berkeley's attempt to give it an independent foundation is a failure. In this I perfectly agree with him. I not only admit, but strenuously assert, that the Berkeleian Theory of Vision was an offshoot of the Berkeleian metaphysics, and has no independent support. The latter statement is just what I sought to prove; the connexion with Berkeley's metaphysics in no way concerned my purpose.

However, with all these hypotheses we have not reached the point or answered the question, which of the two objects—the tangible or the visible—is extension proper, the subject-matter of geometry. Even if it be answered that tangible extension is so, it by no means follows that visible extension may not be so also. For, according to Berkeley, geometry is arithmetic applied to sensible minima. Now, although there may be no resemblance between the sensible minima, yet, as the same science of number is conversant with both, so the same science of geometry might be conversant with both.

Berkeley, indeed, does answer that it is with tactual, not visible, extension that geometry deals. His fundamental argument in proof of this is, that visible extension and magnitude are variable and uncertain. In the face of the observations of the Webers on Touch, no one will now attribute the smallest weight to this argument, or maintain that tangible magnitude is less variable than visible. Berkeley, however, does not confine himself to this; he proceeds to strengthen his position by showing that a pure

intelligence, endowed with sight and not with touch, could have no notion of geometry. His arguments deserve to be quoted:—First: Such an intelligence could have no idea of distance, and, therefore, not of a solid. But why, then, might he not have a knowledge of plane geometry? Because, secondly, he cannot have any notion of a rule or compass; nor, thirdly, can he conceive of one plane or angle being placed on another, since this supposes the idea of distance. He adds that some idea of distance is necessary to form the idea of a geometrical plane. It will be observed, that all these reasons are based upon the one allegation that we cannot see distance. Admitting this, the first reason is valid as against the conceptions of solid geometry, not of plane. As to the other reasons, even if they were valid they would not in the least prove the lack of the geometrical conceptions, but only an incapacity to follow certain methods of demonstration. But no one with any pretence to be a geometer would admit the second and third. The supposition that, in order to conceive a straight line and a circle, we must have the ideas of a rule and compass, is one which our respect for Berkeley's genius must not prevent us from calling puerile and preposterous in the extreme. Nor will any geometer admit that the conception of superposition involves that of physical transfer, or of placing one triangle on the top of another.

The fourth reason has slightly greater plausibility. It is true that to recognise a plane as such implies a conception of that which is not a plane, but to recognise two dimensions simply as two dimensions no more implies the conception of a third, than the recognition of three implies the conception of a fourth.

It may be remarked, further, that these arguments do not directly touch the question of the visibility of geometrical extension, but the question whether geometrical proof

is addressed to the sight—a wholly different question. Secondly, that Berkeley altogether neglects to inquire whether similar objections may not hold against the supposition that such proof is addressed to the touch. That it is so, he assumes without question, as the only remaining alternative. Yet with respect to superposition, for example, it is surely quite as easy (some might think much easier) to conceive visible points or lines coinciding, as tangible points or lines. In his *Common-place Book*, indeed, he shows that this had occurred to him: “I know not what they mean by bidding me put one triangle on another. The under triangle is no triangle—nothing at all, not being perceived.” . . . “If we judge [of equality] by touch, we cannot feel or touch lines and surfaces, according to the mathematicians themselves; much less can we touch a line or triangle that’s covered by another line or triangle.”

Thirdly, he omits what is still more indispensable, namely, to show that what he calls tangible extension is capable of geometrical analysis at all.

Fourthly, while all these reasons rest, as we have seen, on the asserted invisibility of distance, yet, even on that supposition, they prove nothing. At least, until some one appears who thinks that geometrical figures are invisible because we cannot see a triangle lifted up and placed on the top of another, I am justified in affirming that, even on Berkeley’s own view of the invisibility of distance, these arguments are worthless. Are we to believe that Professor Fraser holds them to be conclusive? He has added nothing to them. His definitions, indeed, might have left us in doubt whether he agreed with Berkeley at all; for he defines visible extension as colour, and tangible extension as resistance. Now it is obvious that Euclid’s *Elements* are not the science either of colour or of resistance. Allowing a little freedom to

Professor Fraser's definitions, it might be inferred from them that geometry deals not with tangible, but with visible, extension. For the perception of a resisting point is not necessarily accompanied with the perception of any other points, and, therefore, in no way involves a notion of extension. On the other hand, without artificial apparatus, it is not possible to have a solitary visible perception. The vision of a point is always accompanied with that of an infinite number of other points. This results from the peculiarity of the visual organ, that the entire surface of it is constantly in a state of perceptive activity. As Sir W. Hamilton argues, a perception of differences of colour implies that of extension. In fact, even seeing a black spot on a white ground involves the distinction of sensations perfectly alike (the parts of the white), and therefore implies extension. Accordingly, it is by bounded colour we represent to ourselves geometrical propositions and proofs.

On the other hand, it is impossible to elicit the simplest notions of geometry from that of resistance, however modified. Mr. J. S. Mill, the latest advocate of this derivation of our notion of extension, has not even attempted to show how the notion of a straight line, a plane, of parallel lines, of a right angle, or of equal angles, can be thus derived; or how he can interpret the geometrical axioms that two straight lines cannot inclose a space, or the famous twelfth axiom. Still more difficult, if possible, would it be to give even a meaning to the notion of a plane area or a solid content. Yet he boasts that he has removed all the difficulties that he could discover. One would like to have his interpretation of the theorem that the area of a spherical triangle is proportional to the excess of its angles above two right angles. If there were no such thing as resistance in the world, it would be no less true that the three angles of a plane triangle are together equal to two right angles, and the three angles of a spherical

triangle greater than two right angles. But no conceivable analysis, or combination of efforts, or resistances, or sensations of any kind, could give us the simplest theorem in geometry without an intuition of extension. It is instructive to observe how, unconsciously, Mr. Mill and Mr. Bain fall back upon this intuition while professing to dispense with it. An illustration of this is furnished by a note in which the former refers to an incidental argument of mine. I had said that, if effort not merely measures distance, but *is* distance, then a blind man would judge his eyes and nose, or his back, to be at a greater distance than his desk. Mr. Mill replies: "If the nose is really nearer to his hand than the desk, will he not soon find a way of reaching the nearer object with less locomotive effort than the more distant? If it be said that this can only be done by bending his arm, and that flexure of the arm is attended with more sense of effort than protension of it, the answer is that, even if this had been true, the effort is of a different kind; and the blind man would speedily distinguish between the two, and would learn that objects reached by his bended arm are nearer to his body [*i. e.*, are reached with less effort], by all the other tests of proximity [*i. e.*, of effort], than those which can only be reached with the arm extended." No one could suppose from this passage that the writer held effort to be not merely a measure of extension, but the thing itself, as he expressly states on the next page, and that different muscles mean different directions. If it is "really nearer," the blind man will discover this by "all the other tests of proximity." If he admits that effort is only a test of proximity, then he has surrendered the point at issue; but if, as he asserts, proximity means only attainability by little effort, then his answer is self-contradictory. What he ought in consistency to have said was, that to the blind man his eyes are really more remote than his desk, but in

a different direction, for "different muscles mean different directions."¹

Professor Fraser takes care not to fall into this fallacy. He never uses an expression from which one could gather that he ever had any actual experience of sight at all, so completely *ab extra* does he contemplate the question, much as an unbodied spirit might be supposed to do. Thus, in stating on what sort of considerations his Theory of Vision is founded, he writes thus: "The visibly extended sensations which we perceive when we are seeing an orange have really nothing in common with the hard, resisting sensations which we perceive when we are touching an orange. We cannot possibly identify the perception of *expanded colour*, which is all that originally constitutes seeing, with the perception of *felt resistance*, which is all that originally constitutes touching. Coloured extension is antithetical to felt extension. In fact we do not see, we never saw, and we never can see the orange of mere touch; we do not touch, we never touched, and we never can touch the orange of mere sight. We connect them under the same name indeed. But is not this after we have had experience of each, and also after an unvarying experience has informed us that they were companions? After we have had this experience, as soon as we see the visible orange within our reach, we confidently predict that, on certain organic conditions being fulfilled, we shall have experience of a tangible orange. The simultaneous modifications of coloured expanse which form our visual consciousness are accepted as reliable signs which foretell

¹ To explain the origin of the notion of direction, Mr. Bain says: "Different muscles mean different directions." Now, as the motion or contraction of a single muscle gives what the vulgar call circular motion to the extremity, it follows that what Mr. Bain means by

directions is what other people mean by circles. A circular "direction" is a novelty in geometry. It may be remarked also, that an infinity of directions does not imply more than two dimensions.

the successive modifications of tactual and locomotive sensations which will ensue if we take the orange into our hands and play with it. We may say, if we choose, that we both see and touch the extension of that or any other sensible thing; but in saying this we are playing with words. When we test our words by our experience, we find that the sensibly extended world of which we are conscious in pure seeing has nothing but the name in common with the sensibly extended world of which we are conscious in pure tactual, muscular, and locomotive sense. They are no more to be identified (and called by the same name), than the nine letters which compose the word 'extension' are to be identified either with the colours contemporaneously present in vision, or with the (partly continuous and partly broken) sensations of resistance of which we are conscious when our bodies or any of their organs are in action. In vision, 'extension' consists of a greater or less number of *minima visibilia*; in touch, it consists of a greater or less number of *minima tangibilia*; the magnitude of the sensible thing in each case being proportioned to the number of its respective units; and the term 'extension' being exclusively applicable to either, according as we prefer the greater practical importance of the tangible signification on the one hand, or the greater clearness and distinctness in imagination of its visible sign on the other."

On this the reader may observe that the argument is so far from proving that our visible conceptions of extension are derived from our tactual, that it is every whit as applicable to the counter-view that the tactual are derived from the visual. This, as I have shown, might be very plausibly maintained. But Professor Fraser has made no attempt to show either that extension proper is given by touch at all, or that it is not given by sight; in fact, he seems to regard these propositions as irrelevant, as he

charges me with *ignoratio elenchi* because I try to disprove them; whereas he thinks I ought to have directed my efforts to the comparison of our visual experience of the varieties of expanded colour with our tactual and locomotive experience of resistance, in order to show how expanded colour and felt resistance can be identified. I venture to think that it was more to the point to show that our tactual and locomotive experience of resistance not only is not identical with, but does not necessarily include, the notion of extension at all. I am quite prepared to admit that a "tangible straight or curved line" (to adopt for a moment this peculiar terminology) is wholly different from a visible straight or curved line; but then this is because the former, according to the Professor's definition, is not a line at all, but a "succession of resistances," or of "sensible units of hard and soft," etc. To speak of the straightness or curvature of such a succession is unmeaning. In the passage just cited, indeed the Professor, it may be remarked, completely ignores (designedly, of course) the existence of the very notion of extension which is in question, the notion of geometrical extension. He treats the name "extension" as a sort of *bonum vacans*, which may be assigned to visible minima or tangible minima, just as we think it convenient.

I now come to the question of Association. I have endeavoured to show that the association supposed by Berkeley would violate the general laws of association. Professor Fraser admits that if this is true it is fatal to the theory. His reply to each objection is taken from the analogy of language. This was the analogy suggested by Berkeley himself, and no doubt it is useful as a means of conveying with brevity the import of his theory. So far as language is a system of signs, there is a resemblance; but there the analogy stops. Language is a system of general signs, whereas the signs of Berkeley's visual lan-

guage would not answer their purpose at all if they were general. In founding an argument on this analogy, therefore, it is easy to fall into fallacy. This is what Professor Fraser does. He thinks that the development of this analogy would have enabled Berkeley to obviate many plausible objections to his theory, and he has accordingly developed it himself; with what success we shall presently see.

I had argued that, in order that each separate visible sign may suggest the appropriate tangible object, a separate association is necessary. He replies: "It is not necessary that each of the individual objects of one class should have coexisted with the other which suggests it. Were this so, we could never apply a common term in the English language to a new object. Artificial language, as well as visual language, would be impossible." The inference is clear. As a common term may suggest or be applied to an indefinite number of objects without a separate association, so each sign in the visual language may, without separate association, suggest an indefinite variety of tangible experiences. Precisely; and it is because this does not happen, but each so-called visible sign corresponds with and suggests only one set of so-called tangible experiences, that I have argued that a separate association is necessary. Professor Fraser has taken no notice of the facts on which the argument rests. "It might as well be said," he argues, "that the best way of carrying on a long train of reasoning is to abolish the use of symbols." Now, the process to be illustrated is this: we experience that α , β , are signs respectively of the intervals A , B , and hence it is alleged the signs γ , δ , at once suggest the intervals C , D , with which they have not been associated. There is no resemblance between this process and that of reasoning by symbols. It is their generality which makes the symbols useful, but here the absence of gene-

reality is essential. The fact is, that we are able by sight to distinguish quantities of extension with the utmost minuteness. The supposed visual signs are so far from being general, like the words of a language, that each has its own individual signification. In the case of near distances, there is no interval which can be distinguished by touch which cannot also be distinguished by sight; indeed, as I have shown, sight can distinguish intervals not distinguishable by touch, *i. e.*, in this "language" there is a separate name for every individual object. Every word is a proper name; and these, it may be added, differ only in "pitch." Language does not supply us with an instance in which, having learned what certain names stand for, we know without learning what other names stand for. Music, indeed, furnishes an instance of a language in which each sign has an individual meaning. But, having learned what sounds are represented by the written notes, *A* and *C*, is not sufficient to make the note *B* suggest the corresponding sound. I ask the reader's attention to another fact which is still more conclusive. We have found by continued experience, or, as I allege, by "natural instinct," that a certain diversity of the retinal impressions corresponds to a certain depth. Now, if there is any truth in the alleged principle of suggestion, it is clear that a diversity of double amount ought at once to suggest a greater depth. This is so far from being the case, that the increased diversity does not suggest depth at all, and cannot even be made to do so by practice. On the other hand, if the signs of distance, *e. g.*, are like common terms, they must be all synonymous, each signifying distance in general, and distinction of distance by sight would be impossible.

Accepting, then, Professor Fraser's assurance that in his visual language the same sign may suggest several objects, and combining with it the fact that the same visual

impression does not suggest several distances, figures, etc., I conclude that the theory of a visual language has completely broken down.³

Professor Fraser proceeds to apply this analogy of symbolical conceptions to meet another difficulty, namely, the fact that in reproducing distance, figure, etc., we reproduce them as objects of sight, not of touch, etc., and that it is only when we succeed in doing so that we are able to understand them. In fact, what he calls the tangible properties of an object are far better understood by looking at it than by handling it. "This," says Professor Fraser, "is daily illustrated in all languages when an artificial symbol is substituted for a meaning which," he adds, "is often inconceivable." Yes; it is just when there is a difficulty in conceiving the meaning that there is an advantage in substituting a symbol, which is an object of intuition. But this is very different from the case where the thing meant is not at all inconceivable, but is a sensation or perception.

"We are probably," says he, "as unable either to perceive or conceive even the tangible shapes, sizes, and distance of things, without the help of these visible signs, as we are to carry on a train of thought or reasoning in a complex question without the aid of language." Why can reasoning not be carried on without the use of symbols? Because it is only in this way that it can be general. Now, as already remarked, the admission that the visual signs are analogous to general terms is suicidal. Again, possible and forbidden combinations of concepts which it would otherwise be impossible to bear in mind are readily

³ Each visible "sign" is so far general that it applies to the same distance, although the individual objects vary. But I never alleged that a fresh association was necessary with each individual

object. This is, however, a consequence of the opinion that our judgment of distance depends on our knowledge of the magnitude of the object.

represented by propositions in words. Particles, etc., which are easy objects of sensible intuition, serve to represent very abstract and general relations which otherwise it would be very difficult, if not impossible, to place before the mind. In reasoning we have combinations of combinations, relations of relations, etc. Again, then the laws of judgment and reasoning are easily applied to symbols.

There is absolutely nothing analogous to this in the alleged language of vision. Here the things represented are themselves not hard of conception, but are intuitions or successions of intuitions ; the signs, on the contrary, are complex. There are no combinations to be borne in mind, or laws of combination ; the only question is what is the combination now actually present. The addition or combination of the things signified is not symbolised by addition or combination of the visual signs. It is easier, surely, to conceive or represent effort added to effort than "aerial perspective" added to aerial perspective. If Professor Fraser is right in his analogy, and it is true that the quickest and most exact way to discover the sensible properties of an object is not by the appropriate sense, but by symbols addressed to another sense, then the best way to get a clear notion of, say, a Gothic cathedral, or of the group of the Laocoon, is to shut our eyes and listen to a verbal description.

Another phenomenon which, according to Professor Fraser, is daily illustrated by language is this, that we are able by sight (with or without instruments) to distinguish intervals in depth which are absolutely imperceptible to touch or effort. It is true that when two meanings are difficult to distinguish, it is useful to designate them by different names ; we thus bear in mind that there is a difference, and we can associate different predicates with the two names. But if the two words have meanings wholly undistinguishable to sense or intellect, the fact that we can

distinguish the words does not enable us to make a distinction in the meaning, for none exists. Would Professor Fraser say that we could "carry on a train of reasoning" based on the distinction of words, the meanings of which are to the intellect precisely the same?

If effort not merely measures, but, as Berkeley and his advocates tell us, constitutes distance, then, when the effort is none the distance is none; and to speak of discerning by sight an interval not distinguishable by touch or effort is absurd. Berkeley explicitly admits this.

An essential condition of the usefulness of the symbols of language is the ease with which they are presented and represented. The visual symbols alluded to are so far from being easily called to mind, that neither Berkeley nor his disciples can tell us what they are. They talk of degrees of brightness, etc. These cannot be imagined with any exactness, and it has been experimentally shown that they cannot fulfil the function assigned to them. The facts to which I have referred are, however, still less reconcilable with the alleged analogy. The peculiar visual impression which is the occasion of the perception of a particular amount of distance or depth is not capable of representation.

Professor Fraser, indeed, does not admit that the visual signs are incapable of representation. He says, "To those who are endowed with both senses, the visible experience of an object suggests the corresponding tactual, and the tactual also suggests its correlative visual;".. "only as visual is more easily and distinctly represented in the imagination than tactual experience, the visible sign is more vividly and readily imagined than its tangible or locomotive signification, just as in language the written sign, etc." What the signs are, however, which he thinks are thus vividly reproduced, he does not inform us. What, for example, are his signs of a distance of two yards, or of the

difference between two yards and ten, or between ten inches and twenty? The only signs of distance he mentions are "modifications of coloured length and breadth." Whether by this expression he means anything but variations in brightness and distinctness is not clear. It is, however, capable of strict proof that there are no variations either in brightness or distinctness corresponding to the intervals just mentioned, or to the perception of them. In *Sight and Touch* I have gone into this question in detail; here it may suffice to remark, that the only test of distinctness in the case of an unknown object is the distinctness of the retinal image; and as long as the object is within the wide limits of distinct vision, there is no difference in this respect. This is recognised by Berkeley, who only speaks of indistinctness as suggesting that the object is nearer than the limit of distinct vision. Brightness, again, varies with many other circumstances, but within the limits that concern us, not with distance.³

The opinion that our apprehension of distance is suggested by the sensation accompanying the convergence of the optic axes is more plausible. This is the "idea" which, according to Berkeley, suggests distance in the case of distinct vision. But I do not think anyone will assert that we can easily and vividly recal a particular degree of convergence corresponding to a particular interval. At all events, Professor Fraser does not seem to have included this amongst his visible signs. Dr. Mansel refers to it only with a "perhaps." Convergence evidently does not consist of *minima visibilia*.

Again, as to solidity, what are the visual signs which Professor Fraser recalls so vividly? In this case we hap-

³ I do not know whether writers on this subject may not have had some obscure notion that the brightness of an object diminishes in proportion to its distance, independently of the atmo-

sphere. But this is not the case; until the object is reduced to a point, the amount of light from it which strikes a given portion of the retina remains the same.

pen to know that, in normal vision, with two eyes, the visual impression which "suggests" solidity is a certain difference between the images in the two eyes. Do we recall this easily and vividly, or at all? Can Professor Fraser, or any one else, draw the diagrams fitted to produce a given impression of depth? To go one step farther, will he solve the problem, what is the antecedent of the impression of depth in vision with a single eye? He cannot excuse himself by saying, as other writers do, that the signs which once, perhaps, were present to consciousness now merely suggest their tactual meaning, and are not themselves attended to; for he insists that tactual experience suggests the visual signs, and not only so, but that the visual signs are more easily and vividly represented in imagination than the tactual meaning. I think it is clear that in making this statement he confounded the visual signs with the complex experience made up (according to the common view, of these signs, and of the reproduction of the so-called tactual experience; the very thing which I claim as visual, and which, according to him, is not the sign, but the thing signified. What confirms me in this is that, in the above quoted statement, which concerns a fact of observation, and not a theory, Professor Fraser stands, I believe, alone. All other writers take pains to explain why we cannot be conscious of the visual signs.

It is at all events to experiment that we are indebted for the answer to the question, what occasions the perception of distance and of solidity? The stereoscope has been of essential service in this inquiry. Professor Fraser, indeed, says of these phenomena, somewhat curiously, that they "illustrate with marvellous distinctness the visible signs of solidity." If for "illustrate" we substitute "eliminate," the remark will be more correct. They do, in fact, enable us to eliminate all the "visible signs" mentioned by Berkeley and his disciples, including Professor Fraser, showing

that they did not know a single word of the language which they asserted they were incessantly using. From these phenomena we have learnt that the antecedent of the visual apprehension of depth (whether called sign or not) is, in the case of binocular vision, a certain difference in the impressions on the two retinae. In the case of vision with one eye, the antecedent appears to be an analogous combination, although this has not yet been actually proved. This is sufficient for our present purpose, without considering the question of the apprehension of distance absolutely. Of these sense-impressions it is important to observe—*first*, that they are not accompanied by the corresponding perception of depth, etc., except on the condition that they are not themselves present to consciousness. As long as we are aware of two impressions, there is nothing resembling or approaching to the perception of solidity or depth. *Secondly*, the difference of impression which conveys this perception is strictly limited. Within a certain limit we are conscious only of solidity; outside a certain limit we are conscious only of two images. Experience does not enable us, in the former case, to become conscious of the double picture, or, in the latter, of solidity. There may be, and probably is, a slight interval between these limits, within which experience has some effect, but this does not form any exception to the statement that the two perceptions are mutually exclusive. These facts are sufficient to set aside the analogy of language.

The slightness of Professor Fraser's attention to vulgar facts is amusingly exemplified in his treatment of the objection that association between the visual appearance and the locomotive effort corresponding to distances beyond the reach of the arm is impossible, inasmuch as the sensation of so much effort is not present until we have reached the object; by which time the visual appearance has passed through a series of changes. Deliberate atten-

tion to the original appearance is of course out of the question. The visual appearances are in the order *a, b, c, d, e*, and the locomotive sensations are *ε, ζ, γ, β, α*. It is as if we were teaching a child a new language, and always took care to separate the word and its meaning by an indefinite quantity of other words and meanings. Professor Fraser replies: "There is no difficulty; you have only to walk backwards, and the thing is done." No doubt; and if the question were the practical one, how to educate the next generation in accordance with the Berkeleian theory, the suggestion might deserve attention. But the present question is, what can or cannot exist under certain given conditions, one of which is, that we have not hitherto been walking backward all our lives.

Professor Fraser appears to mistake my argument based on the organic changes by which the eye accommodates itself to the vision of varying distances. The organic change is preceded by one organic impression and followed by another. It is not to the organic change that I have attributed the function of suggesting distance, &c., but to the organic impression, and I have referred to the change as proving the existence of the organic impression. My critic proceeds to say that, if we are conscious of these organic changes, they are merely an additional set of signs. He says "additional," doubtless from a natural reluctance to admit that the signs he had himself specified were no signs at all. But as it is certain that we are not conscious either of the organic change or the organic impression, what does he say of this alternative? Why, then they are "irrelative" to the Berkeleian problem, "unless," he adds, "he [I] supposes that they mechanically inspire the mind with a kind of sensible knowledge of which it has had no previous sense-experience at all." The facts referred to "do not enable us to comprehend the rationale of the connexion between coloured expanse and past and future continuity

of resistance;" that is to say, the facts do not agree with the arbitrary assumption that extension means continuity of resistance, and therefore they must be set aside as irrelevant. If they are true, what can be more relevant? The Berkeleian Theory of Vision asserts that our tactual experience is associated with a set of visible signs, and that the supposed vision of distance is this tactual experience suggested by these signs. Professor Fraser finds it necessary to maintain, further, that these visible signs are easily and vividly reproduced in imagination. I show, from experiments admitted by all scientific men, that there are no such signs, and that what he calls reproduced tactual experience depends on a set of conditions wholly distinct from, and independent of, his alleged visible signs; and he says this is irrelevant, because it does not solve "the Berkeleian problem." But suppose it proves Berkeley's solution to be erroneous, is that nothing to the purpose? Suppose it further proves that the problem itself, as above stated, is founded on a mistake, and involves a *petitio principii*, is that irrelative to the problem?

I may remark, however, that this was not Berkeley's own statement of his problem. Professor Fraser quotes from the *Principles of Human Knowledge*, indeed, to show that Berkeley's meaning of distance was that just referred to, *i.e.*, continuity of resistance. It is true, Berkeley deduces this from his theory; it is not true that he assumes it. If he had done so, where would be the novelty of his theory? Nobody ever supposed that continuity of resistance, past or future, was an object of sight. And when Berkeley says that distance is a line directed endwise to the eye, could he mean that past and future continuity of resistance is a line, etc.?

Professor Fraser remarks that I have not criticised the plausible doctrine that extension, distance, figure and motion are not ideas of sense at all, but suggested accom-

paniments of sense-experience. I presume he refers to Kant's doctrine. That doctrine is perfectly consistent with my view, and it would have been beside my purpose to criticise it. But surely Professor Fraser has forgotten his own definitions when he calls it "plausible." Does he think it, then, a plausible doctrine that "uncoloured resistance" or "successions of tactual experience" are not ideas of sense, but "suggested accompaniments of sense-experience"?

"Berkeley's language," proceeds Professor Fraser, "liberally interpreted in analogy with his philosophy as a whole, appears to affirm that actual outness is neither an object of sight nor of touch." Indeed Berkeley, in his *Common-place Book*, remarks, "Extension is blended with tangible or visible ideas, and by the mind præscinded therefrom" (*Life*, etc., p. 494). This is a sensible remark, but it sweeps away the whole notion of association, and the argument based on the heterogeneity of visible and tangible extension.

I must take some notice of Professor Fraser's remarks on the observations made on the recovered blind. He justly notices the difficulty of interpreting the language of such persons, which is necessarily the language of the seeing, although the ideas they attach to the words used may be different. Nevertheless, he makes no attempt to interpret their expressions, but takes the crude reports of Cheselden and Nunneley, and assumes that the words used mean what they would mean in the mouth of the seeing. But even thus they lend no support to Berkeley. For what, according to Berkeley, ought to be the experience of a blind man newly "made to see"? "The blind man would certainly think that nothing seen was without his mind." He would take these for a new set of sensations existing only in his mind. Is this view supported by the fact that one patient said that objects appeared to touch his eyes, even apart

from the fact that his words were contradicted by his conduct, for he walked about with his hands before his eyes? As to the famous question whether such a person could distinguish a cube and a sphere, Berkeley says, "to ask of the two bodies which was the sphere and which the cube were to him a question downright bantering and unintelligible."

Every case on record falsifies these anticipations of Berkeley. Some go much further—in particular that of Dr. Franz, whose patient actually distinguished and named correctly a square, a circle, and a triangle. Indeed so conclusive are the facts observed in this case, that they shook Mr. Mill, who, not unnaturally, suggested a doubt whether the original blindness had been complete. This was set beyond question, however, by Dr. Franz's careful examination. In fact there is no case on record in which the blindness was more complete. Nor is there anything in the case inconsistent with other cases; only the patient was better prepared for the experiments, owing to his familiarity with geometrical figures, etc., and the experiments were more carefully conducted.⁴

Since the publication of my book, another case has been reported, being that of a young woman, twenty-two years of age, who had been "stone-blind" from birth with congenital cataracts. It is stated that she "put her hand to the window to try to catch the trees at the other side of the street": also that she "tried to touch the ceiling of a high ward"; thus incontestably proving that visible objects did not seem to be in her mind, or even in her eye. Not one

⁴ Some observers have asked their patients to recognise such complex objects as a pencil-case or a bunch of flowers; others, who have tried the cube and sphere, have been too hasty in putting the objects into the patient's

hands. If anyone is disposed to think little of the difficulty of recognising objects of touch at first sight, let him try the corresponding experiment of trying to read with his fingers the books embossed for the blind.

case is on record which confirms Berkeley's anticipations. All the patients regarded the objects of sight as external, and capable of being touched, and many also perceived that they were at some distance. The amount of effort necessary to reach them can, of course, be known only by experience.

These and similar facts will be better appreciated if we bear in mind what are the notions which the persons operated on must have had previously, by the admission of such advocates of Berkeley as Professor Fraser and J. S. Mill. They accept without question Platner's account of the ideas of the born blind, "They have absolutely no perception of an outer world, except as something effective different from their own feeling of passivity" "They hardly rise," says Professor Fraser, "above a dark notion of another cause, another efficient mind." When we contrast this with the experience of those who have just begun to see, and have as yet had no time to learn from association, we can hardly resist the conclusion that the perception of extension proper and of distance is native to the sense of sight. It seems, then, hard to account for the fact that Mr. Mill and Professor Fraser take a wholly opposite view. We cannot suspect Mr. Mill of reasoning thus: The blind man has no idea of spatial externality. The seeing man has. Therefore this idea of spatial externality is not a visible idea at all, but a tangible. I conjecture, then, that his reasoning was this: Our whole notion of extension is from touch; touch only gives the succession of resistance, therefore our whole notion of extension is only succession of resistance. He assumes the minor (the first) without proof, and regards Platner's observation as proving the major. But it happens to be the minor that is disputed, and the whole point of Platner's observation is that the blind man's notion of extension is not the same as the seeing man's. At least one would think it self-evident that no, observations on a

blind man could prove what is the nature of the ideas of a seeing man.

Professor Fraser's comment is somewhat curious: first, he interprets the statement that time serves instead of space to the blind man, thus; "in other words, his experience of successive resistance or resistant extension serves instead of the visual experience of a perspective of various colours;" adding, "How, by any amount of mere handling, can we ever gain the faintest conception of visible figures or magnitudes, or of the visible appearances which are significant of greater or less distance?" Thus, by substituting for "space" "visual experience of a perspective," etc., and for "distance" "visible appearances significant of distance," he twists the passage into agreement with his own views. He proceeds: "We are probably as unable either to perceive or to conceive distinctly even the tangible shapes, sizes, and distances of things, without the help of their visible signs, as we are to carry on a train of thought and reasoning in a complex question, without the help of artificial language." The born blind "have no natural language to symbolize externality." On the same principle, a blind man ought to be incapable of forming a conception of harmony or melody, for want of the visible symbols. After what has been already said about language, this singularly fallacious analogy may be left without further comment. But it may be asked what phenomena would Professor Fraser or Mr. Mill expect the blind man to exhibit, if it were true, as I maintain, that the perception of extension, etc., is a direct perception of sight?

If we could find an instance in which the faculty of sight was present, without that of locomotion, it would supply a sort of *experimentum crucis* as to the knowledge supplied by the former faculty. The nearest approach to such a case is that of Eva Lauk, referred to by Schopenhauer, and reported in Froriep's *Notizen* (vol. vii.). This

girl, having neither arms nor legs, was quite destitute of the faculty of locomotion; yet it is stated that she not only had the same ideas of extension as persons in a normal condition, but was able to apprehend distance, etc., by sight. Mr. Mill has suggested that the feeling of being carried about would suffice instead of the sense of locomotion. But without a previous idea of space, the sensation of being carried could give no more idea of motion through space than the sensation of sitting in a railway carriage. There is no exertion of the locomotive faculty, and no succession of resistances. Some writers have thought to find this in the motions of the eye itself. Even if we concede the existence of a sense of muscular effort in connexion with these motions, it would hardly meet the requirements of the theory. But the evidence is against its existence. For example, if the object looked at move laterally, with moderate quickness, instead of requiring an effort to follow it, an effort is required to avoid following it. If a succession of objects pass before us, it becomes painful to keep the eyes fixed; and we may often observe in such cases in the eyes of others (especially young children) a rapid motion to and fro, arising from the repeated efforts to recover the position, which is as often involuntarily lost. If the eyes be fixed on a light, and the head turned quickly or shaken, the eye will, without effort, remain directed to the light, and it will be found difficult to keep it fixed in the orbit. In fact, it is impossible to do so if the rapidity surpasses what the eye is capable of in its voluntary motions. By this motion of the head, the eye can be made to move in its orbit with much greater rapidity than by the voluntary action of its own muscles.⁵ A light fixes the eye better than a non-luminous object. I have observed the eyes of

⁵ When the motion is very rapid, the eye naturally yields to it to a small extent; but this does not affect the general accuracy of the remarks in the text.

an infant a few days old thus fixed upon a light, while its body was turned about pretty quickly, just as the needle turns to the pole while its pivot is turned round. Similarly, when we direct attention to an object at varying distances, it requires a positive effort to prevent the appropriate convergence and accommodation. From such facts we may conclude that the effort of which we are conscious in looking at an object is not generally a muscular effort at all. It is true that when we look at a very near object—*i. e.*, one nearer than the ordinary limit of distinct vision—there is a sense of effort. We need not discuss the nature of this effort, since the case is exceptional. It is to be observed further, that in the normal eye the position of absolute rest is that in which the eyes are adapted to distant vision, and it is for near objects that effort is required. This is clearly the very reverse of what the theory demands.

The phenomena which shook the faith of Smith and Hamilton in the Berkeleian theory were those exhibited by the lower animals. It is clear that the grounds on which the visibility of distance is denied are quite as applicable to animals as to man. Hence some writers have spoken of the facts referred to by Smith and Hamilton as “incredible.” I allude to the question here in order to draw attention to the interesting experiments by Mr. Douglas Spalding, published in *Macmillan's Magazine*, Feb., 1873. These experiments place beyond doubt the fact of the visual perception of distance by certain animals at the first instant of seeing. The *a priori* arguments, therefore, alleged to prove the essential invisibility of distance must be fallacious; and it becomes a mere question of fact whether the similar perception which man possesses is original

In fact, the eye yields exactly as the compass needle would yield slightly to friction when its pivot is rapidly turned, although the force of friction be very

slight compared with the magnetic force. The force with which the light fixes the eye is quicker in action than the force of its own voluntary muscles.

and (if we choose to say so) "instinctive" or acquired. To suppose that this conclusion is evaded by attributing the perception in the case of animals to "instinct," is to "take words for things"; as if "instinct" were the name of a special faculty belonging to the lower animals exclusively. That the perception is instinctive in the only sense in which a perception can be so called is the very thing we affirm in opposition to Berkeley.⁶

The reader will, perhaps, be surprised to learn that Professor Fraser is after all not unwilling to surrender the main points at issue. First, he surrenders his view that distance is a tactual conception, when he favours the opinion that "the notion of distance is not an impression of sense at all, but a result of presumptive or inductive intelligence." Secondly, he is prepared to admit that our visual apprehension of distance is native, not acquired. "Berkeley's Association," says he, "is attributed not to the accidents of custom in our previous experience, but to the custom of the Divine Activity, if one may say so, and therefore to a custom which is Reason itself." What is this but to say that the visual apprehension of distance, etc., accompanies our visual impressions, not as an "acquired perception," but just as originally as any other perception?

⁶ Some light is thrown on the meaning of the term "instinct" by its history, which, if it has ever been noticed, appears to be forgotten. When we say that an action is done by instinct, the expression is elliptical; the proper phrase being "by natural instinct," "instinctu naturali," that is to say, "by the prompting of nature." Tacitus, it may be remembered, uses the words "instinctu centurionum" to signify "by the prompting of the centurions." When the meaning of the word "instinct" was forgotten, it came

to be looked upon as the name of a faculty, and the word "natural," the more important of the two, was regarded as superfluous. It seemed no more necessary to speak of "natural instinct" than of "natural understanding." Nothing, however, has been added to the connotation of the expression, which, whether abridged or not, still signifies simply "the prompting of nature." This properly applies to action only. To say that a thing is known by instinct is to say that the knowledge is an ultimate fact.

Still more explicitly, he says: "The Theory of Vision is a reasoned defence of the proposition that what is called 'seeing' the externality, distance, figure, and size of a real thing is truly interpreting the visual signs with which real extension, distance, figure, and size are arbitrarily but universally associated in the perpetual providence of a Supreme Mind. Berkeley may be right in conceiving the relation to be analogous to what we find in artificial language, and yet wrong in supposing that man requires to learn the language by experience and association of ideas. Its meaning might be given to us instinctively, as it were." This is precisely the way in which Reid and others express the relation of sensation to perception generally. There is nothing, then, in this proposition inconsistent with the doctrine that extension, distance, etc., are objects of direct perception by sight, nor is there anything in it which is not equally applicable to the perception of motion, etc., by effort. If by "instinctive interpretation" it is implied only that we see no necessary connexion between the sensible impression and the perception, this is partly true, but it is not less true of touch and locomotion than of sight. It is true, also, of every sensation.

But it is to be further observed that the proposition just stated would not have served Berkeley's purpose. His problem was not—given the ideas of extension, etc., to account for the visual discernment of externality, etc. On the contrary, he desired to show that there is no such thing as spatial externality at all. More logical than some of his recent disciples, he saw that if his principles were granted, their necessary result was that extension, as geometers conceive it, has no existence, either real or ideal. This is, no doubt, a bold paradox in the face of the existence of a whole body of demonstrative science built on this conception. But Berkeley did not shrink from assailing the foundations of geometry. At the close of his *Theory of*

Vision he states that his doctrine leads to a new view of geometry. His *Common-place Book* enables us to fill up some of the details of this new view. According to it, "one square cannot be double of another; therefore, Euclid, 1. 47, is false."

"Particular circles may be squared, because, the circumference being given, a diameter may be found, between which and the true there is not any perceivable difference; therefore there is no difference, extension being a perception, and a perception not perceivable is a contradiction, nonsense, nothing."

"Lines, etc., are not infinitely divisible, for such divisibility would suppose the external existence of extension, which is false."

"Circles on several radius's are not similar figures. Diameter and circumference are not in the same proportion in all circles."

"*Query.* Whether the propositions, or even axioms, of geometry do not, divers of them, suppose the existence of lines, etc., without the mind."

"There are no incommensurables. A mean proportional cannot be found between any two given lines, but only between those the number of whose points multiplied together produce a square number. All lines cannot be bisected," etc., etc. In short, "*Subvertitur geometria, non practica sed speculativa.*"

He is led to these conclusions by his view that extension is discontinuous, being, in fact, only number. We find in the *Common-place Book* the entry—"Mem. Take heed how you define extension for fear of the geometers." His attempt to define it is this: "Extension seems to consist in a variety of homogeneous thoughts co-existing without mixture." And again, "Geometry is arithmetic applied to points." Arithmetic, however, does not generate a new science by being applied to a particular class of

objects; nor can arithmetic distinguish between points arranged in a straight line and points arranged in a triangle, or a curved line.

But why this eagerness to explain away the idea of extension? The question is answered by a remark in his *Common-place Book*—"The great danger of making extension exist without the mind is that, if it does, it must be acknowledged infinite, immutable, eternal, etc., which will be to make either God extended (which I think dangerous) or an eternal, immutable, infinite, uncreate being beside God" (*Life*, p. 490). Now, "what extremely strengthens us in prejudice is, that we think we see an empty space" (*ibid.*, p. 438). Accordingly, the *Theory of Vision* was written in order to remove the apparent objection which might have been raised against his Idealism.

Berkeley, as might be expected, has no more tenderness for physical than for geometrical science. Professor Fraser, indeed, endeavours to propitiate physicists:—"Physical science professes only to add to our knowledge of what sensible phenomena are the signs of what other sensible phenomena. It can never convert the symbolism which forms its own exclusive province into efficient causality." No doubt, physical science cannot disprove Berkeley's theories; but it may possibly be a result of physical science to make those theories appear a less simple solution of the problems of cognition. Professor Fraser's statement respecting the aims of physical science applies well enough to chemistry; but does it apply to all science? What of the theories of Light, of Electricity, of Nutrition? It is difficult even to translate such inquiries into Berkeleyian language; but in fact, on Berkeley's principles, they are futile and unmeaning. The antecedents or steps in the processes discussed are, *ex hypothesi*, insensible, and therefore non-existent, according to Berkeley. The supposition of the existence of a luminiferous ether would mean,

on his theory, the supposition of a series of thoughts or volitions in the Divine mind, which, not being perceivable by us, are not a succession at all, and in fact have no existence. Or, to pass to acknowledged facts, what is the meaning of saying that light takes such and such an interval to traverse the planetary spaces, *e.g.*, from the sun to us? The existence of the light at the moment of its issuing from the sun is existence in the Divine mind only. The successive movements in its transit have only the same existence. Therefore the statement means that, from the moment that God brings the light into existence (in His own mind) until it can become an object to us, there must intervene a series of Divine volitions. But as there is no succession of ideas in God (so Berkeley expressly states), this is a contradiction, and the moment of creation is really the moment of its becoming perceivable by finite spirits. Berkeley would have no difficulty in accepting this interpretation. He says that "for want of understanding time, motion, etc., men are forced into such absurd contradictions as this, viz., that light moves sixteen diameters of the earth in a second." How are we to translate into Berkeleian the laws of gravitation, that all bodies attract one another with a force varying inversely as the square of the distance? Berkeley saves us the trouble, by telling us that on his theory it is absurd. "Materialists must allow the earth to be actually moved by the attractive force of every stone that falls from the air, with many other like absurdities."

If Galileo had learned Berkeleian, he would have known that there is no difference whatever between the earth going round the sun and the sun going round the earth. "Why," asks Berkeley himself, "should the sun be thought many thousand miles rather than one foot in diameter, both being equally apparent diameters?"

Microscopic investigations are a delusion. It is impos-

sible for the same thing to have two magnitudes, therefore the thing seen through the microscope is a different thing from that seen by the naked eye. This is Berkeley's own statement. And of course we are equally mistaken if we think that the telescope can give us any information as to the objects seen with the naked eye.

I am quite aware that no physical considerations can actually demonstrate the falsity of a metaphysical theory. But we cannot form a proper estimate of such a theory without taking into account its mode of dealing with the principles and results of physical and other material sciences. With mathematics it is different. A metaphysical theory which postulates the subversion of speculative geometry is self-slain; and Berkeley's theory, as we have seen, does this by his own confession. Over the portals of his philosophy is inscribed—

μηδὲς οὐκ ἀγεωμέτρητος εἰσίτω.

As Berkeley holds that a number of sensible points not merely measures but constitutes extension, similarly he holds expressly that the succession of ideas not merely measures but constitutes time. The manifest logical consequence of this is, that there is no difference between succession and simultaneity, for the ideas have no duration, nor is there any interval between them. Time, then, like space, is only number.

As to the soul, he states in his *Common-place Book*, "The very existence of ideas constitutes the soul." . . . "The understanding seemeth not to differ from its perceptions or ideas." Consequently, "in sleep and trances the mind exists not," and, consequently, we may add, "personal identity" is a contradiction—in fact there is no identity of anything; πάντα ῥεῖ. On the other hand, "The will and understanding may very well be thought distinct beings." If we ask, "do these volitions make one will?" he replies

that the question is merely about a word, "unity being no more." It appears, therefore, that he anticipated, and was prepared to accept, Hume's extension to all existence of his principle of "the paralysis of the sensible world," as Professor Fraser calls it.

In these remarks on the logical results of Berkeley's theory, I have limited myself almost entirely to the consequences actually drawn by Berkeley himself. There is, however, one important question which he hardly considered, and which in fact no disciple of his has attempted to face, namely, the question, Have I any right to assume the existence of any finite minds besides my own? How can I make the first step beyond my own ideas, and affirm the existence of something which I cannot perceive? Berkeley himself, who admitted the principles of causality, etc., had no difficulty in proving the existence of one Supreme, or, at least, superior mind; but this satisfies all the phenomena, as he states them, and renders the existence of other minds a superfluous hypothesis. Mr. Mill, who does not admit the principle of causality, or any other *a priori* principle, is utterly illogical in assuming the existence of "other people." He does not seem to have thought what a vast bound he was taking when he overleaped the limits of his own inner world, and postulated the existence of a world of which he could have no experience or knowledge whatever, and before he could have analogy of any kind to assist him.

However, as I have not undertaken to discuss the whole system of Berkeleian metaphysics, I shall not dwell longer on this; but it is too vital a point to be passed by without notice. My purpose was to vindicate my refutation of the Received Theory of Vision. I have succeeded in my original object, if it is conceded, as it is now by such authorities as Professor Fraser and Mr. Mill, that the Theory of Vision, if tenable at all, is only tenable as part of a system

which, by the admission of its author, subverts geometry, and reduces astronomy, microscopic science, geology, and other important branches of inquiry, to puerile absurdities; which, in short, logically denies existence to anything but sensations. My argument, indeed, reaches further. Being founded on fact, not hypothesis, it shows the *Theory of Vision* to be untenable, apart from any metaphysical considerations. If Berkeley's or any other metaphysical system requires us to accept a Theory of Vision which is in contradiction to unquestionable facts, its beauty and simplicity will not make it stand.

THOMAS K. ABBOTT.

THE LETTERS OF QUINTUS CICERO.

THE *brochure* on the duties of a candidate for the consulship, usually styled the *De petitione Consulatus Liber*, is not so called by any writer before the date of the MSS. in which it is preserved. The Author of the *Essay* himself seems to have wished it to be known by the title *Commentariolum Petitionis* (by which name I shall therefore designate it), and to have hoped that his work, though primarily intended for the guidance of one particular candidate, would be regarded as a compact and convenient handbook of electioneering tactics by future aspirants to office in Rome. It takes the form of a letter. In no MS. has it an inscription inconsistent with the character of a letter; the epigraph of by far the best MS., the *Codex Erfurtensis* (called D by Orelli, and E by Baiter), is *Q. M. Fratri S. D.* This MS. was collated by Wunder, who assigns it to the fourteenth century, but Bücheler agrees with Meyncke in placing it in the end of the eleventh century, or the beginning of the twelfth. E may, indeed, almost be called the *only codex* of the *Commentariolum*. The Italian MSS. collated by Lagomarsini, and the *Parisini* of Voss, are (with, perhaps, unnecessary warmth) designated as a *sterquilinium* by Bücheler. One of these unsavoury MSS. (L 38 of Lagomarsini) strangely ascribes the authorship to the great Marcus, and makes the treatise a letter to his brother Quintus; other Lagomarsinian MSS. take the ordinary view, and ascribe the letter to Quintus; while one (L 117) has this inscription:—*De petitione Consulatus ad Q. aut M. Ciceronem Fratrem. Quod opusculum pars M. Ci-*

ceronis, pars Quinti esse volunt. Phrasis autem et ratio Quinto adiudicant, nam solus Marcus consulatum gessit.

That the *Commentariolum* was a letter written by Quintus to his brother Marcus during his candidature for the consulship is the verdict of every editor from Valerius Palermus to Bücheler. But in the sphere of criticism no opinion is in such a perilous position as that opinion which has never provoked dissent. It was unendurable that any proposition should go so long unquestioned, and, in 1872, in the person of Adam Eussner,¹ the hour and the man both came. Eussner holds that the *Commentariolum* is a *cento* from certain works of Cicero, compiled by some learned man, much given to logical division, but quite destitute of grace or force of style,² who, on account of his accurate familiarity with the details of the period of Cicero's candidature, and by reason of his considerable acquaintance with the style of the Ciceronian Age, must be held to have flourished about the end of that period.

One cannot but agree, to some extent, with Eussner's view as to the lack of literary merit in the *brochure*. It derives its interest neither from grace of style, nor from its matter and contents. It owes its interest chiefly, if not altogether, to one circumstance—the very circumstance on which Eussner grounds his view. It is this. The *Commentariolum* has two or three vigorous attacks on the competitors of Cicero, clothed (notably in one instance) in vigorous and original phrase. These reappear almost word for word in the fragments of Marcus Cicero's *Oratio in Toga Candida* preserved in the Commentary of Asconius. To account for this phenomenon only two theories are possible (for the coincidence

¹ *Commentariolum Petitionis* examinavit et ex Buecheleri recensione passim emendatum edidit Adam Eussner, Virceburgi, MDCCCLXXII.

² "Qui, cum et earum rerum, quæ Cicerone petente consulatum ageban-

tur, admodum gnarus sit, et ab eo qui illa ætate vigeat, sermone non alienus esse videatur, tempore ab ipsa Ciceronis ætate proximo floruisse putandus est."—*Eussn. Comm. Pet.*, p. 22.

cannot be accidental, either (1) M. Cicero borrowed from the author of the *Commentariolum*, or (2) the author of the *Commentariolum* borrowed from M. Cicero. The latter is the opinion of Eussner, who fancies that he can detect in the *Commentariolum* not only plagiarism from the *Oratio in Toga Candida*, but from the *pro Plancio*, the *pro Murena*, and the first letter of Marcus to his brother Quintus, on the Duties of a Provincial Governor (Q. Fr. I. 1). As the speech *pro Plancio* was written A. V. C. 700, the *Commentariolum* must, on this hypothesis, be posterior to the consulship of Cicero by about ten years. The theory is, of course, at the very outset met by the difficulty (which Eussner does not attempt to solve, that it represents the author of the *Commentariolum* as keeping up an elaborate parade of ignorance, and carefully concealing his knowledge of the issue of the contest and other such matters, of which knowledge not a vestige appears in the *Commentariolum*. For instance, the author speaks of Catiline, not Antonius, as Cicero's most formidable opponent. Now, surely, the compiler postulated by Eussner would not thus have neglected the chances of the ultimately successful candidate, and in so doing depreciated his counsel, by betraying his want of political foresight; the more especially as he might have estimated never so highly the chances of Antonius' success without at all betraying his knowledge of the issue. When the author of the *Commentariolum* speaks of Catiline as Cicero's most formidable opponent, surely the natural inference is that the tract was written in the beginning of the year 690 A. V. C., when Catiline's prospects actually did look bright, or at least before the month of June, when his excesses had begun to swell the ranks of Antonius' supporters; unless Eussner is prepared to maintain that his compiler of set purpose introduced statements falsified by the issue, so as to conceal the posterior origin of the *brochure*, and to impart to it the appearance of

having been the work of Quintus, under whose name he wished to recommend to posterity his own Essay. But it will not be necessary to apply such tests to demonstrate the unsoundness of Eussner's theory, if it can be shown (as I think it can) that he has altogether failed to establish any such coincidences between the *Commentariolum* and any work of Cicero (save the *Oratio in Toga Candida*), except merely fortuitous coincidences in words, such as might exist between any two works of the same period. Before, therefore, I examine these supposed plagiarisms from the *pro Plancio*, *pro Murena*, and the first letter to Quintus, I shall briefly advert to the *positive* arguments for the authorship of Quintus, and weigh Eussner's objections against the same.

The *Commentariolum* cannot have been written before 690 A. V. C., as Bücheler has shown, because, of the six candidates mentioned by Asconius as competing with Cicero only two are deemed worthy of consideration. Now, we know from Att. I. 1, that in July, 689, it was not certain even who would come to the poll; so that we must allow some time for the waxing and waning of the candidature of four other competitors. Moreover, the verdict in the trial of Catiline, which took place probably about November of 689, is spoken of as not a very recent event. The date of the Essay, therefore, cannot have been earlier than the beginning of 690. But it must have been written before June, 690, for Catiline's chances are preferred to those of Antonius; but we know that about June the supporters of Catiline began signally to fall away. Therefore the date of the Essay may be placed in the beginning of 690 A. V. C. The positive arguments, then, for the authorship of Quintus are these :

(1). At this period Quintus would have had abundant leisure for the composition of his Essay, for he had just laid down his ædileship. And now, too, the treatise would have been particularly well timed, if looked on in the

proper light, namely, as an attempt to point out the tactics of a really able canvass, which, however, should in nowise conflict with the law; for the five years immediately preceding the candidature of Cicero were singularly fertile in laws regulating the procedure at elections, and in prosecutions for infringement of the same. Now, the *Commentariolum* preaches a rigorous purism in keeping within the letter of the law: for instance, *nomenclatores* are not mentioned, as they were forbidden by a recent, but universally neglected, enactment. Quintus, therefore, might have conferred on his brother a really solid benefit in mastering the recent legislation on the subject of *ambitio*, and pointing out how far he could avail himself of the arts of electioneering without coming into collision with the law. This task would have demanded the leisure which Quintus had and Marcus lacked.

(). This Essay is a *libellus isagogicus* on the model of the treatise in which Varro had recently (A. V. C. 684) given instructions to Pompeius how to hold a senate as Consul. We are told by Gellius that this treatise was afterwards lost, and that Varro subsequently treated the same subject in a letter to Oppianus. May not the *Commentarium isagogicum* of Varro have suggested to Quintus his *Commentariolum petitionis*, and may not the form chosen by Quintus have suggested to Varro, in the second edition, the idea of throwing his tractate into the shape of a letter?

(3). From Q. Fr. III. 1, 23, we may infer that Quintus was familiar with the precepts of Epicharmus; now in Comm. 39 we have the words *quamobrem* 'Επιχάρμειον *illud teneto* "*nervos atque artus esse sapientiæ non temere credere*," a maxim afterwards quoted by Marcus (Att. I. 19, 8) in its Greek and metrical form,

νᾶφε, καὶ μέμνασ' ἀπιστεῖν· ἄρθρα ταῦτα τῶν φρενῶν.

(4). In Att. II. 3. 3, Cicero says to Atticus, "Θιοφράστον

περὶ φιλο-μετίας (the certain conjecture of Victorius for φιλορείας of Med.) *affer mihi de libris Quinti fratris:*" Quintus then had in his library a work which may have suggested to him the treatise, or at least aided him materially in its execution.

(5). The whole letter of Marcus to Quintus on the subject of the Duties of a Provincial Governor (Q. Fr. I. 1) reads as a companion-essay to the *Commentariolum*; it is a practical expression of the degree to which Marcus appreciated the sympathy of his brother at a critical time; and probably would never have been written but for the *Commentariolum*, with which it about coincides in length. Moreover, it contains many expressions which seem directly to refer to the essay of Quintus; for instance, *Quod si ut amplissimum nomen consequeremur unus præter ceteros adiuvisti* (Q. Fr. I. 1, 43); and again, *idcirco et tua longissima quaque epistola maxime delector, et ipse in scribendo sum sæpe longior* (*ibid.* 45). To this be it added, that we learn from the letters of Marcus to Quintus *passim*, that Marcus habitually in all important affairs sought from his younger brother and gratefully acknowledged such practical counsels as form the staple of the *Commentariolum*. Other arguments which might be adduced as positive evidence for the authorship of Quintus will more fitly fall under the answers to Eussner's objections against the same, which I now proceed to consider.

(1). The first objection of Eussner to the belief in Quintus' authorship is, that the author of the *Commentariolum* begins not with the very beginning of Cicero's *petitio*, in the middle of July, 689 A. V. C., when Cicero *prensandi initium facere cogitarat in campo comitiis tribunicis* (Att. I. 1, 1) but at a considerably later period, when his only formidable rivals were Antonius and Catiline. Now this circumstance seems to me to point unmistakably to an inference directly contrary to that which Eussner

draws. Surely the compiler postulated by Eussner would have begun from the very beginning, and thus given artistic completeness to his Essay; Quintus, on the other hand, writing in the beginning of 690, omits the past, for which counsel is now unavailing, and addresses himself to advise his brother under the circumstances which actually surrounded him.

(2). Again, Eussner argues that Quintus, who had held no office but ædileship, must have been quite unqualified to instruct his brother, who had already distinguished himself as prætor, quæstor and curule ædile. The coincidences between the *Oratio in Toga Candida* and the *Commentariolum*—coincidences which I fully admit—would, in the mind of Eussner, show Marcus in the light of a base plagiarist, if Quintus were the author; *fac* (says Eussner) *tam humilis atque abiecti animi fuisse Marcum, hominem eloquentissimum, ut quod ipsi emendandum esset commendatum fratris opusculum expilaret*. But this rhetoric shows an utterly false point of view on the part of Eussner. The letter was written by Quintus in order to bring together under the view of his brother, and in an organised shape, maxims of procedure which were no doubt familiar to him, but which it might be convenient to have by him reduced to a system, *non ut aliquid ex iis novi addisceres, sed ut ea quæ in re dispersa atque infinita viderentur esse, ratione et distributione sub uno aspectu ponerentur* (Comm. 1). This Quintus had abundant leisure to do, having just laid down his ædileship; *hæc sunt quæ putavi non melius scire me quam te, sed facilius his tuis occupationibus colligere in unum locum posse et ad te perscripta mittere* (Comm. 58). Marcus was at liberty to use (as he did in his *Oratio in Toga Candida*) some vigorous expressions taken from his brother's letter in denunciation of his rivals, as much as he was at liberty to act on the practical precepts therein enjoined, nor is he open to the charge of undue appropriation in the one case more than

in the other. Nay more ; suppose it to be granted for a moment that it would have been a dishonest act to have made use in his speech of these expressions found in his brother's letter, not even so would the character of Marcus suffer, for we learn from *Comm.* 58,³ that Quintus submitted his work to the criticism of Marcus, requesting him to curtail, enlarge, and modify it as he thought fit, and hinting that if it met his brother's approval, he might publish it as a guide to future candidates, though an incomplete one (he owns), as having primary reference only to Marcus and his election.⁴ These expressions, then, in which the *Oratio in Toga Candida* and the *Commentariolum* coincide, may have been inserted by Marcus, in accordance with his brother's request.

As to the unfitness of Quintus to offer counsel to Marcus, we need only observe that such unfitness was not felt by Marcus. He says afterwards of Quintus, *si ut amplissimum nomen consequeremur unus præter ceteros adiuvisisti* (Q. Fr. I. 1, 43), and in the same letter, *quid enim ei præcipiam quem ego in hoc præsertim genere intellegam prudentia non esse inferioriorem quam me, usu vero etiam superiorem ?* (Q. Fr. I. 1, 18). Moreover, all the letters of Marcus to Quintus afford *passim*

³ *Quæ tametsi ita sunt scripta ut non ad omnes qui honores petant, sed ad te proprie et ad hanc petitionem tuam valeant, tamen, si quid mutandum esse videbitur, aut omnino tollendum, aut si quid erit præteritum velim hoc mihi dicas.* From these words Tydeman argues that Quintus cannot have been at Rome when he wrote the *Commentariolum*, as in that case he would in a personal interview have asked his brother to criticise his Essay, instead of embodying the request in the Essay itself. Bücheler draws the opposite inference because Quintus writes *velim hoc mihi dicas* instead of *velim hoc mihi scribas*.

I agree with Tydeman ; *dicere* is used constantly for a communication made by letter. Eussner sees in the absence of date and address an argument for the fictitious character of the letter. So Sergeant Buzfuz maintained that it was "a circumstance in itself suspicious" that the second communication of Mr. Pickwick to Mrs. Bardell bore no date.

⁴ So afterwards Quintus requests his brother to correct and edit his *Annales*, *Q. frater me rogat ut Annales suos emendem et edam* (Att. II. 16, 4). Marcus readily complied with his brother's request.

proofs that Marcus sought and found a valuable counsellor in Quintus in all the most important of his affairs, and fully appreciated his worth as an adviser. Nor did Marcus despise his brother's literary gifts; afterwards, in speaking of a poem, probably the *Annales*, referred to above, which Quintus submitted to him, just as he submitted the *Commentariolum*, for correction and revision, the prince of stylists did not think it humiliating to say, *sine ulla mehercule aipwvelq loquor; tibi istius generis in scribendo priores partes tribuo quam mihi* (Q. Fr. III. 4, 4). In truth, that it would be undignified in the great and distinguished Marcus to ask or accept literary aid from the humble Quintus, is a point of view far more likely to occur to a modern German than to an ancient Roman, especially such a Roman as the gentle, refined, and high-minded M. Cicero.⁵

(3). The *Commentariolum* is, according to Eussner, below the style of Quintus, as described by his brother, and unlike the four letters from Quintus found in the correspondence of Cicero, Fam. XVI. 16, 8, 26, 27. But Eussner does not allow for the kindliness so strongly characteristic of Cicero, which led him to overstate his brother's merits. We have seen above that Marcus pronounces his brother superior to himself in poetry. Now it seems to me that Cicero's *Aratea*, and other poetical fragments, not excepting the much decried *O fortunatam*, &c., will well bear comparison with the twenty hexameters of Quintus, *De XII. signis*, which may be taken as typical of the poetry of Quintus, if the four surviving letters may be looked on as sufficient basis for a judgment on his prose style. To me it seems that the *Commentariolum* is worthy of the letters, nor does it differ from them in tone and style more than a practical treatise cast in an epistolary mould would naturally differ from a familiar letter—than the letter of Marcus on

⁵ For other expressions of Marcus, brother, see Q. Fr. III. I., 19, Q. Fr. III., eulogistic of the literary merit of his 6, 7, De Orat. II. 10.

the Duties of a Provincial Governor (Q. Fr. I. 1) differs from his jocular letters of gossip and chit-chat, like some of his letters to Atticus and to Caelius.

Eussner and Bücheler greatly exaggerate the imperfection of the style of the *Commentariolum*, though of course both it and the letters of Quintus are incomparably below the standard of Marcus. Many of these supposed defects would pass quite unnoticed if the work had been attributed to Marcus; indeed many of them can actually be paralleled in the writings of the great orator. For instance, the frequent use of *quoniam* in the *Commentariolum* is severely animadverted on by Bücheler and Eussner; this conjunction is used seven times in Q. Fr. I. 1, and but eight times in the *Commentariolum*. That *anaphora* that is so offensive to Bücheler and Eussner in the *Commentariolum* passes unnoticed, or is a pleasing figure in the hands of Marcus, when he writes *nullum te signum, nulla pictura, nullum vas, nulla vestis, nullum mancipium, nulla forma cuiusquam, nulla pecunia* (Q. Fr. I. 1, 8); and at least half a dozen other instances of *anaphora* may be found in that letter. The writer of the *Comment.* is guilty of vile taste in allowing the *v* sound to recur so often in a sentence (*Comment.* 54), *in tot hominum cuiusque modi vitiis versantem vitare offensionem, vitare fabulam, vitare insidias*, but Marcus goes unproved when he writes *vix videmur summam vituperationem posse vitare*, (Q. Fr. I. 1, 41). Again, the frequent use of the phrases *cura ut, cogita ut, fac ut*, is condemned in the *Comment.*, but passes unnoticed in Q. Fr. I. 1. In both letters these phrases occur with unusual frequency, but this is because both letters are didactic expositions addressed to a single individual. But all through what would be called happy boldness in Marcus is tasteless affectation in Quintus.

What in the *Consul's* but a choleric word,
That in the *Aedile* is flat blasphemy.

Eussner even ascribes a post-Ciceronian origin to the *Commentariolum*, because we find *suffragatorius* ἅπαξ εἰρημένον. Not to mention ἅπαξ εἰρημένα in Marcus, we have only to turn to one of the four admittedly genuine letters of Quintus to find *dissuaviabor*. If in four short letters we find a ἅπαξ εἰρημένον, we need not be startled at finding another in an essay about ten times as long as the four letters together.

(4). The *Comment.* does not reflect the character of Quintus, as described by Marcus. We find no traces of the *iracundia*, which was his besetting sin. This, in my mind, strongly *disproves* the authorship of Eussner's supposed compiler, who would most certainly have attempted to make his work seem an authentic letter by introducing some traits or expressions in keeping with the character of Quintus, as described by his brother in many places, and especially in that very letter which was supposed to be one of the sources of the compiler's *cento*, namely, the letter (Q. Fr. I. 1) on the Duties of a Provincial Governor. Here I may observe that Eussner was unfortunate in selecting the works of Marcus from which was patched up the forged letter. Among them, it will be remembered was the *Oratio pro Murena*, which (as we shall see) in Eussner's opinion the compiler must have studied very closely. Now in this speech (*Or. pro Mur.*, 30) Cicero expressly says, *cum duae essent artes quae potuerunt locare homines in amplissimo gradu dignitatis, una imperatoris, altera oratoris*. Is it not strange that though in this speech, so closely studied by the compiler, it is laid down that there are two roads to the highest office, military distinction and forensic preëminence, yet he should have dwelt on the latter alone in the *Commentariolum*, and completely passed over the former?

These are the *adminicula* of Eussner's argument, which mainly rests on the supposed plagiarisms in the *Commentariolum*, not only from the *Orat. in Tog. Cand.*, but

from the *Oratt. pro Plancio* and *pro Murena*, and from Q. Fr. I. 1,—plagiarisms which in his opinion show the treatise to be a mere piece of patchwork from the writings of M. Cicero.

I shall now point out the remarkable coincidences between the *Commentariolum* and the *Oratio in Toga Candida*, and then examine the grounds on which the author of the *Commentariolum* is deemed by Eussner to have availed himself not only of the *Oratio in Toga Candida* in framing his literary forgery, but also of the Letter of Marcus to Quintus on the Duties of a Provincial Governor, the *Oratio pro Murena*, and the *Oratio pro Plancio*. The coincidences between the *Comment.* and the *Or. in Toga Candida*⁶ are found only in the part of the *Comment.* which deals with the denunciation of Cicero's rivals. These are as follows:—

Writing of *Antonius*, Quintus says—

(a). Vocem audivimus iurantis se Romae iudicio aequo cum homine Graeco certare non posse. (*Comm.* 8.)

Of the same, Marcus says—

(a). In sua civitate cum peregrino negavit se iudicio aequo certare posse. (*Orat. in Tog. Cand.*)

In describing the murder of Marius Gratidianus by Catiline, Quintus says—

(b). Quid ego nunc dicam petere eum consulatum qui hominem carissimum populo Romano, M. Marium, inspectante populo Romano . . . occiderit . . . collum secuerit. (*Comm.* 10.)

Marcus says of the same deed—

(b). Populum vero, quum, inspectante populo, collum secuerit hominis maxime popularis, quanti faceret ostendit. (*Or. in Tog. Cand.*)

⁶ It may be useful here to observe that Asconius never mentions the *Commentariolum*, and seems not to have been aware of its existence.

Again Quintus—

(c). Vivo spiranti collum gladio sua dextera secuerit, . . . caput sua manu tulerit. (*Comm.* 10.)

Marcus—

(c). Quod caput etiam tum plenum animae et spiritus . . . manibus ipse suis detulit. (*Or. in Tog. Cand.*)

In touching on the incest of Catiline with Fabia, a Vestal virgin, Quintus says—

(d). Qui nullum in locum tam sanctum et tam religiosum accessit, in quo non, etiam si alia culpa non esset, tamen ex sua nequitia dedecoris suspicionem relinqueret. (*Comm.* 10.)

Marcus—

(d). Cum ita vixisti ut non esset locus tam sanctus quo non adventus tuus, etiam cum culpa nulla subesset, crimen adferret.

Quintus, in speaking of the chances of the election of Antonius and Catiline, says—

(e). Quis enim reperiri potest tam improbus civis qui velit uno suffragio duas in rempublicam sicas destringere. (*Comm.* 12.)

Marcus—

(e). Qui posteaquam illo ut conati erant Hispaniensi pugiunculo nervos incidere civium Romanorum non poterant; duas uno tempore conantur in Rempublicam sicas destringere. (*Or. in Tog. Cand.*)

In addition to these remarkable coincidences of expression, we find a marked coincidence of treatment; we learn from Asconius that in denouncing Catiline, Marcus dwelt on his having put to death certain Roman knights, especially Q. Caecilius; adverted to his profligacies, his malversation of Africa, the depositions at the trial, and the verdict; and we learn that he upbraided Antonius with the public sale of his goods: now all these topics find place, and in the same order, in the *Commentariolum*. But, of course, coinci-

dence of treatment might be accidental; not so the remarkable coincidences of expression just adduced. We may observe, too, how Marcus, in adopting the topic or the expression of his brother, adds some additional force or point to the words adopted. This is especially observable in (b) and (e), while in (d) the same subject is treated by each writer exactly as befits the case of each. The allusion in the passage is to the case of Fabia, a Vestal, who was accused of an intrigue with Catiline, tried for unchastity, and acquitted. This Fabia was the sister of Terentia, the wife of Marcus, and Terentia took refuge with her afterwards in the Temple of Vesta when Cicero fled from Rome (Fam. XIV. 2. 2). It is this connexion with his own family that makes Marcus careful to add *etiam cum culpa nulla subesset*; Quintus, in the words *etiam si alia culpa non esset*, does not quite so emphatically acquit Fabia.

In the face of these remarkable coincidences, it is strange that Eussner should persuade himself that he has made out his case that the pseudo-Quintus had availed himself of the *Oratt. pro Murena* and *pro Plancio*. The subjoined list will (I think) at once show that in no single case of those quoted by Eussner is there any greater resemblance of phraseology than would naturally be found in two contemporary writers treating of a kindred topic, except perhaps in (d), where it is quite possible that Marcus availed himself of a reminiscence of his brother's Essay which he had, perhaps, been editing very recently; while in some instances, e. g. in (g), it is an insult to the intelligence of his readers that Eussner should quote a sentence as a plagiarism because it has a verb or a construction in common with another sentence.

(a). Or. p. Mur. 11, 24, *gravis etiam illa est et plena dignitatis dicendi facultas, quae saepe valuit in consule deligendo*: Comm. I. 3 *nominis novitatem dicendi gloria maxime sublevaris. semper ea res plurimum dignitatis habuit*.—(b). p. Mur.

17, 36 *nihil est incertius vulgo, nihil obscurius voluntate hominum, nihil fallacius ratione tota comitiorum*: Comm. XIV 54 *Roma est civitas ex nationum conventu constituta, in qua multae insidiae, multa fallacia, multa in omni genere vitia versantur.*—(c). p. Mur. 18, 37 *ambae (res) in consulatu Murenarum profuerunt: una, expectatio muneris, quae et rumore nonnullo et studiis sermonibusque competitorum creverat*: Comm. XIII 50 *sequitur ut de rumore dicendum sit, cui maxime serviendum est.*—(d). p. Mur. 21, 43 *nescio quo pacto semper hoc fit, neque in uno aut altero animadversum est, sed iam in pluribus: simul atque candidatus accusationem meditari visus est, ut honorem desperasse videatur*: Comm. XIV 56 *atque haec ita nolo te illis proponere, ut videre accusationem iam meditari, set ut hoc terrore facilius hoc ipsum quod agis consequare.*—(e). p. Mur. 21, 44 *petitorem ego, praesertim consulatus, magna spe, magno animo, magnis copiis et in forum et in campum deduci volo:—praesertim cum—ex vultu candidatorum coniecturam faciant, quantum quisque animi et facultatis habere videatur*: Comm. IX 34 *et quoniam asseclationis mentio facta est, id quoque curandum est, ut cotidiana cuiusque generis et ordinis et aetatis utare. nam ex ea ipsa copia coniectura fieri poterit, quantum sis in ipso campo virium ac facultatis habiturus.*—(f). p. Mur. 23, 47 *graviter homines honesti atque in suis vicinitatibus et municipiis gratiosi tulerunt*: Comm. VI 24 *sunt enim quidam homines in suis vicinitatibus et municipiis gratiosi.*—(g). p. Mur. 24, 48 *cum tu populum Romanum in eum metum adduxisti*: Comm. VI 23 *adducenda amicitia in spem.*—(h). p. Mur. 25, 50 *vim denuntiabat, rei publicae minabatur. quibus rebus qui timor bonis omnibus iniectus sit quantaque desperatio rei publicae, si ille (consul) factus esset, nolite a me commoneri velle*: Comm. XIII 53 *spes rei publicae bona de te sit et honesta opinio. nec tamen in petendo res publica capessenda est.*—(i). p. Mur. 33, 69 *prope de nocte ex ultima saepe urbe deductum venire*: Comm. XII 49 *ut de nocte domus compleatur.*—(j). p. Mur.

33, 69 *omitto clientes, vicinos, tribules*: Comm. V 17 *tum ut tribules, ut vicini, ut clientes.*—(k). p. Mur. 34, 70 *homines tenues unum habent in nostrum ordinem aut promerendi aut referendi beneficii locum, hanc in nostris petitionibus operam atque adsestationem*: Comm. V 19 *profecto hi omnes et spe reliquorum tuorum officiorum et recentibus beneficiis ad studium navandum excitabuntur*. VIII 31 *si vero etiam praesidi se aliquid sibi constituere putant, non amittunt occasionem promerendi.*—(l). p. Mur. 34, 70 *neque enim fieri potest neque postulandum est a nobis aut ab equitibus Romanis, ut suos necessarios candidatus adsectentur totos dies: tenuiorum amicorum et non occupatorum est ista assiduitas*: Comm. IX 37 *ab is plane hoc munus exigito, qui per aetatem ac negotium poterunt, ipsi tecum ut assidui sint, qui ipsi sectari non poterunt, suos necessarios in hoc munere constituent.*—(m). p. Mur. 34, 71 *sine eos, qui omnia a nobis sperant, habere ipsos quoque aliquid, quod nobis tribuere possint*: Comm. VI 21 *rogandi sunt atque etiam in hanc opinionem adducendi, ut qui adhuc nobis obligati fuerint, is vicissim nos obligari posse videamur.*—(n). p. Mur. 36, 77 *nam si nomine appellari abs te cives tuos honestum est, turpe est eos notiores esse servo tuo quam tibi*: Comm. VII 28 *nam qui incipiat Antonius homines adiungere atque invitare ad amicitiam, quos per se suo nomine appellare non possit?*—(o). p. Mur. 36, 77 *nec candidatis ista benignitas adimenda est, quae liberalitatem magis significat quam largitionem*: Comm. XI 44 *benignitas autem late patet: est in re familiari*.

Subjoined are the supposed plagiarisms from Q. Fr. I. 1. (c), (d), (i), (k), (p), and (q) are particularly strange specimens of coincidence.

(a) Ep. ad Q. Fr. I 1, 1 *Etsi non dubitabam,—tamen existimavi*: Comm. 1, 1 *Etsi tibi omnia suppetunt,—tamen—sum arbitratus.*—(b) Ep. 1 6 *qui aut, quod publicani sunt, nos summa necessitudine attingunt, aut, quod ita negotiantur, ut locupletes sint, nostri consulatus beneficio se incolumes for-*

tunas habere arbitrantur : Comm. XIII 53 (*ut existiment equites et viri boni ac locupletes ex vita acta te studiosum otii ac rerum tranquillarum—futurum.*—(c) Ep. 2, 7 *cuius natura talis est, ut—videatur moderata esse potuisse* : Comm. II 9 *cum semper natura tum etiam aetate iam quietum.*—(d) Ep. 3, 10 *nam quid ego de Gratidio dicam?* Comm. III 10 *quid ego nunc dicam?*—(e) Ep. 4, 12 *sed habes eos tecum, quos possis recte facientes facile diligere* : Comm. VIII 33 *deinde habeto tecum ex iuventute optimum quemque.*—(f) Ep. 4, 14 *sed si quis est, in quo iam offenderis, de quo aliquid senseris* : Comm. IX 35 *si eum, qui tibi promiserit, audieris fucum ut dicitur facere aut senseris.*—(g) Ep. 5, 15 *frons, oculi, vultus persaepe mentiuntur, oratio vero saepissime* : Comm. XI 42 *frons et vultus et sermo ad eorum, quoscumque convenerit, sensum et voluntatem commutandus et accommodandus est.*—(h) Ep. 5, 15 *te autem, alienum hominem, ament ex animo?* Comm. IV 13 *si qui admodum te amant* ; V 18 *ex animo—tui studiosi.*—(i) Ep. 5, 16 *et invident non nostris solum, verum etiam suis* : Comm. IV 14 *quam multi invidi sint.*—(j) Ep. 6, 18 *quid enim ei praecipiam, quem ego in hoc praesertim genere intelligam prudentia non esse inferiorem quam me?* Comm. XIV 58 *haec sunt, quae putavi non melius scire me quam te, set facilius his tuis occupationibus colligere unum in locum posse.*—(k) Ep. 6, 19 *in tanto imperio, tam depravatis moribus* : Comm. XIV 54 *in tot hominum cuiusque modi vitiis tantisque.*—(l) Ep. 11, 32 *quibus (publicanis) si adversamur, ordinem de nobis optime meritum* : Comm. I 3 *habes enim—omnes publicanos, totum fere equestrem ordinem.*—(m) Ep. 12, 35 *sed et ab iis,—qui tibi omnia debent, hoc petas* : Comm. IX 37 *qui autem tibi debent, ab is plane hoc munus exigito.*—(n) Ep. 12, 36 *at ea quidem—non ut te instituerem, scripsi* : Comm. I 1 *non sum alienum arbitratus ad te perscribere—non ut aliquid ex his novi addisceres.*—(o) Ep. 13, 37 *quare illud non suspiciam, ut, quae de iracundia dici solent a doctissimis hominibus, ea nunc tibi exponam* ; —illud— :

Comm. X 39 *non est huius temporis perpetua illa de hoc genere disputatio, quibus rebus benivulus et simulator diiudicari possit; tantum est huius temporis*—.(p) Ep. 13, 37 *praetermittendum esse non puto*: Comm. III 10 *mihi non praetermittendum videtur*—.(q) Ep. 13, 38 *nihil—te fieri posse iucundius*: Comm. V 16 *carum et iucundum esse maxime prodest*.

The *Orat. pro Plancio* Eussner omits to examine in detail "*cum non ita multi loci cum Commentariolo consentiant*." I fancy it would be easy to construct a large list of coincidences as close as those cited from Q. Fr. I. 1, and the *Orat. pro Murena*.

So much for Eussner's attempt to disprove the authorship of Quintus. If coincidences such as those which he adduces were really sufficient basis for such a theory, I should have very little hesitation in undertaking to prove that Macaulay's Essays were the work (let us say) of Mr. Gladstone. But what would be a sufficient ground on which to base the disproof of the authorship of Quintus? It would be sufficient to point to some event mentioned in the Essay which occurred after the death of Quintus, or to show that ignorance is betrayed of some fact of which Quintus must have been cognisant. No attempt has been made to allege the existence of any allusion in the Letter to any event subsequent to the time of Quintus. On one point, however, Eussner has attempted to fix an inaccuracy on the author of the *Commentariolum*. *Nam hoc biennio* (says Quintus), *quattuor sodalitates hominum ad ambitionem gratiosissimorum tibi obligasti, C. Fundanii, Q. Gallii, C. Cornelii, C. Orchivi* (Comm. 19). On the words of Cicero, *alter induxit eum quem potuit ut repente gladiatores populo non debitos polliceretur* (*Orat. in Tog. Cand.*), Asconius has this note: *Q. Gallium, quem postea reum ambitus defendit, significare videtur. Hic enim, cum esset praeturae candidatus, quod in aedilitate quam ante annum gesserat, bestias non habuerat, dedit gladiatorium sub titulo patri se id dare*. Asco-

nus therefore places the trial of Q. Gallius subsequent (*postea*) to the *Oratio in Toga Candida*, therefore in A. V. C. 690, at the earliest; on the other hand, the author of the *Commentariolum* (as understood by Bücheler and Eussner) places the trial two years back, that is, in A. V. C. 688. Now, be it remarked in the first place, that it is by no means necessary that we should understand *hoc biennio* to mean *two years ago*; the words might as well mean that all these trials by which Marcus had won so much influence had occurred *in the course of the last two years*. But even granting that *hoc biennio* should be understood to mean *two years ago*, there is not the least ground for charging Quintus with inaccuracy. Quintus is probably right, and Asconius wrong. Such is the view of Bücheler, who shows that, in the matter of the gladiators at least, Asconius has blundered, in ascribing to Gallius what was the act of Catiline, as we know from the distinct testimony of Cicero himself. If, then, Asconius erred about the gladiators, may he not have erred about the date of the trial of Gallius? Bücheler says *yes*; Eussner says *no*; but Eussner offers no reason for his belief, but will not give up the only inaccuracy which he has ventured to allege against his fancied compiler, who, writing at least ten years after the time of Cicero's candidature, has not (if this allegation be abandoned) incurred even the suspicion of a mistake.

In my opinion, therefore, the *Commentariolum petitionis* was written about the beginning of 690 A. V. C.; the author was Q. Cicero; it was intended primarily to be of practical service to M. Cicero in his candidature, but the author hoped that after it had undergone the revision of his eminent brother it might be deemed to have a substantive value as a manual of electioneering tactics. Whether Marcus ever actually did undertake the work of revising his brother's Essay, we cannot be certain. We know that in the case of the *Annales* Marcus promptly complied with a like request, *ego te libenter, ut rogas, quibus rebus vis adiu-*

vabo, et tibi versus quos rogas, γλαῦκ' εἰς Ἀθήνας, mittam (Q. Fr. II. 15, 4). On the other hand, we see that the Essay still labours under that incompleteness which its author owns, *ita sunt scripta ut non ad omnes qui honores petant, sed ad te proprie et ad hanc tuam petitionem valeant* (Comm. 88); Marcus, however, would hardly have employed his editorial authority in divesting the Letter of its primary and special application to his glorious consulship. The Letter did not, probably, find its way into the earliest collections of the correspondence of Cicero made immediately after his death, for Asconius seems to have been ignorant of the existence of the *Commentariolum*. But in no case should the *Commentariolum* supply any materials to the detractors of Cicero. If the greatest of Roman orators availed himself of the topics and expressions of his undistinguished brother, he only took that which was offered for his acceptance, and which he enhanced tenfold by his approval. Nor is there any ground whatever for supposing that he ever contemplated alienating from his brother any of the λήκυθοι of his Essay. The three or four *purpurei panni* were recognised as belonging to the literary wardrobe of Quintus when the Essay appeared (whether edited or not by his brother), and no doubt took on an added colour in the eyes of Rome, if it was remembered that the great Marcus had deigned to flaunt them in the faces of his rivals. Nor must we forget that there is still another view to be taken about these passages common to Marcus and Quintus. It is quite possible that these are the thunders forged by Marcus, and made over to the hand of Quintus—that Marcus, far from alienating from Quintus the children of his brain, rather brought out from his own copious stores some bright apparel to set off his brother's little bantling in the eyes of his countrymen.

ROBERT YELVERTON TYRRELL.

ON THE DATE OF THE CAPTURE OF MYCENÆ BY THE ARGIVES.

NO one seems to have found any difficulty in the statement of Diodorus, which Pausanias repeats, that the town of Mycenæ was destroyed by the people of Argos *after the Persian Wars*, though I fancy most scholars, when they first come to attend to it, are surprised that the ancient city of Mycenæ should have lasted so long in close neighbourhood to Argos, and made so little figure in Greek history. I suppose any doubt of this kind is allayed by the recollection that Herodotus mentions eighty Mycenæans as having joined the Greeks at Thermopylæ, and that he also enumerates both Tirynthians and Mycenæans among the cities or tribes of Greeks which were inscribed on the pedestal of the tripod at Delphi as joining in the repulse of the Persians. The actual pedestal at Constantinople confirms him, for we read in the list *Μυκᾶνες*, and thus the existence of Mycenæans up to the year 470 B. C. is beyond all doubt.

I have, nevertheless, grave suspicions whether either historian has given us a true account of the matter, and therefore propose the following hypothesis, to invite discussion. If I have overlooked any decisive evidence, I hope it will be put forth in refutation of my conjecture. I will first quote all Pausanias' statements on the point, but will group them into two classes, irrespective of their order, for the sake of more convenient discussion :—

II. 15, 4.

ἐγὼ δὲ αἰτίαν τε γράψω τοῦ οἰκισμοῦ, καὶ δι' ἣντινα πρόφασιν Ἀργεῖοι

CAPTURE OF MYCENÆ BY THE ARGIVES. 61

Μυκηναίους ὕστερον ἀνέστησαν. 16, 5. Μυκήνας δὲ Ἀργεῖοι καθεῖλον ὑπὸ ζηλοτυπίας. ἡσυχάζοντων γὰρ τῶν Ἀ. κατὰ τὴν ἐπιστρατείαν τοῦ Μήδου, Μυκηναῖοι πέμπουσιν εἰς Θερμοπύλας ὀγδοήκοντα ἀνδρας οἱ Λακεδαιμονίοις μετέσχον τοῦ ἔργου [inaccurate]. τοῦτο ἡνεγκέ σφισιν ὀλεθρον παροξύναν Ἀργεῖους.

Then follows the famous passage about the ruins, and about the tombs of Agamemnon and his party, which M. Schliemann has brought into such fresh notoriety.

V. 23, 2.

[In the list of cities inscribed on the monument of the victory over the Persians, which Pausanias saw at Olympia, and which appears not to have been an exact duplicate of that at Delphi.]

ἐκ δὲ χώρας τῆς Ἀργείας Τιρύνθιοι, Πλατ. δὲ μόνοι Βοιωτῶν, καὶ Ἀργείων οἱ Μυκήνας ἔχοντες. 3. τούτων τῶν πόλεων τσαῖδε ἦσαν ἐφ' ἡμῶν ἔρημοι. Μυκηναῖοι μὲν καὶ Τιρύνθιοι τῶν Μηδικῶν ὕστερον ἐγένοντο ὑπὸ Ἀ. ἀνάστατοι.

VII. 25, 5.

Μυκηναίοις γὰρ τὸ μὲν τεῖχος ἀλῶναι κατὰ τὸ ἰσχυρὸν οὐκ ἐδύνατο ὑπὸ Α. (ἐτετείχιστο γὰρ κατὰ ταῦτα [this is not accurate] τῷ ἐν Τίρυνθι ὑπὸ τῶν Κυκλώπων καλουμένων) κατὰ ἀνάγκην δὲ ἐκλείπουσι Μ. τὴν πόλιν ἐπιλειπόντων σφᾶς τῶν σιτίων, καὶ ἄλλοι μὲν τινες ἐς Κλεωνὰς ἀποχωροῦσιν ἐξ αὐτῶν, τοῦ δημοῦ δὲ πλεον μὲν ἢ ἡμισυ ἐς Μακεδονίαν καταφεύγουσιν παρ' Ἀλέξανδρον, ὃ Μαρδόнийος ὁ Γωβρύου τὴν ἀγγελίαν ἐπίστευσεν ἐς Ἀθηναίους ἀπαγγεῖλαι· ὁ δὲ ἄλλος δῆμος ἀφίκοντο ἐς τὴν Κερύνειαν, καὶ ἐς τὰ ἔπειτα ἐγένετο ἐπιφανεστέρῃ διὰ τὴν συνόκησιν τῶν Μυκ.

Nothing seems more precise than this. Pausanias was evidently quite sure of his facts, though one of them—the participation of the Mycenæans in the battle of Thermopylæ—was certainly wrong according to Herodotus. They went there, indeed, but retired with the other Greeks, who left the Spartans and Thespians with Leonidas. Apart from this, it seems, then, that the Argives were so jealous

of the fame of Mycenæ on account of this glorious battle (at which Mycenæans never fought), that they undertook the siege of the great Cyclopean fort, and having starved out the population of the place, which they could not storm, they drove them out of the land to Kleonæ, Kerynea, and to Macedonia. The same lot befell the Tirynthians for the same reason, though Pausanias adds no details about the siege of their equally wonderful fort, which excited his loudest admiration.

Herodotus corroborates the participation of Mycenæ and Tiryns in the Persian War, and says they together furnished four hundred men to the army of the Greeks, which fought at Plataea. He is perfectly silent as to the consequences of this act.

Let us now examine a very different passage.

VIII. 27, 1.

συνήλθον δὲ ὑπὲρ ἰσχύος ἐς αὐτὴν [sc. τὴν Μεγαλὴν πόλιν] οἱ Ἄρκαδες, ἅτε καὶ Ἀργείους ἐπιστάμενοι τὰ μὲν ἔτι παλαιότερα μόνον οὐ κατὰ μίαν ἡμέραν ἐκάστην κινδυνεύοντας ὑπὸ Λακεδαιμονίων παραστήναι τῷ πολέμῳ· ἔπει δὲ ἀνθρώπων πλήθει τὸ Ἄργος ἐπηύξησαν, καταλύσαντες Τίρυνθα καὶ Ὑσιᾶς τε καὶ Ὀρνεᾶς καὶ Μυκήνας καὶ Μιδεῖαν καὶ εἰ δὴ τι ἄλλο πόλισμα οὐκ ἀξιόλογον ἐν τῇ Ἀργολίδι ἦν, τὰ τε ἀπὸ Δακ. ἀδεέστερα τοῖς Ἀργ. ὑπάρχοντα, καὶ ἅμα ἐς τοὺς περιόικους ἰσχυρὰ γενομένην αὐτοῖς.

This passage is corroborated by II. 25, 6 and 8, in which the destruction of Orneæ and of Tiryns are mentioned in the same way. Thus, in § 8, ἀνέστησαν δὲ καὶ Τίρυνθιους Ἄργ., συνοίκους προσλαβεῖν καὶ τὸ Α. ἐπαυξῆσαι θελήσαντες.

This account appears not only inconsistent with the former, but contradictory to it. There, the inhabitants of Mycenæ are expelled, and added to the strength of other cities; here, the special reason of the dispute is to secure more citizens for Argos, and to increase and consolidate its power. Anyone who considers the conditions of the ques-

tion for one moment will not hesitate to prefer this latter—a sound political view—to the sentimental story about Argive jealousy. The συνοικισμός of the Argive territory was like that of Thebes, of Athens, and of Megalopolis; and there can be no doubt that the importance of Argos in Greek history was wholly due to its early success in this most difficult and unpopular revolution.

But is it possible that it took place *after* the Persian Wars? I think not. In the face of the patriotic conduct of Tiryns and Mycenæ, and at the moment of Argos' greatest national unpopularity, any such attempt to destroy free Greek cities would have brought down the vengeance of all Greece. Moreover, early historians are silent about it. Herodotus and Thucydides never allude to it. What is still more remarkable, the contemporary Æschylus, though composing plays which ought to have had their scene laid at Mycenæ, never once mentions Mycenæ, and transfers the palace of Agamemnon to Argos.¹ If the more ancient city, whose inhabitants had fought with him in the great Persian struggle, had only lost its independence in his mature age, is such a curious ignorance on his part conceivable? I think, then, that the συνοικισμός of the Argive territory must have taken place long before, and that Pausanias was misled by the monuments of the Persian War to transfer it to an impossible period.

If we look back into earlier history, and consider at what time Argos was daily expecting an attack from Sparta, and found it necessary to strengthen its power, I think the most natural period will be not immediately after

¹ This mistake seems to have been noted by critics of an early date, for both Sophocles and Euripides mention and distinguish the two cities, though they seem to confuse the inhabitants. I was unable, when on the spot, to make out the picture suggested at the

opening of Sophocles' *Electra*, which seems, as it were, drawn on the spot, but is more probably a fancy sketch. But Mycenæ is very prominent in it. Sophocles even wrote a play called *Μυκηναῖαι*.

the Persian, but immediately after the Messenian Wars, that is, the second Messenian War, which was concluded in Ol. 29. According to our revised chronology, the development of Phidon's power at Argos must be placed close to this time, and it was probably the twenty-eighth Ol. which he celebrated with the Pisatans at Olympia to the exclusion of the Eleans. Of course the Spartans were bound to interfere, but the Messenian War must have greatly hampered their vigour. When this war was over, and Sparta had acquired new territory and prestige, the Argives must have expected that they would be the first to suffer. Hence I attribute to Phidon, and to his policy, the consolidation of all the smaller towns in Argos, and perhaps this may have been the secret of his greatness.

But how then is the existence of Tiryns and Mycenæ during the Persian War to be explained? I suppose that these towns, though conquered, and their gods transferred to Argos, nevertheless continued to exist as *κῶμαι* or villages, but inhabited by Argive citizens, and that accordingly these descendants of the old inhabitants, who took the patriotic side, and had not forgotten their history, joined the Hellenic army under these obsolete names, which the nation was glad to sanction as a slight to the neutral Argives.³ The very small number of men they were able to muster (80 from Mycenæ at Thermopylæ, 400 from Mycenæ and Argos together at Plataea) strongly corroborates this view; for in that day the smallest Greek towns had a considerable armed population—Plataea, for example, had 600. It is very likely that the Argives were nettled at this conduct, and determined to efface these places altogether; and this change, which was very unimportant, as the real *συνοικισμός* had been long accomplished, attracted no notice at the time, but gave rise afterwards to a distortion of history.

³ Of course they need not have come directly from Mycenæ, but may have been exiles, who came together under the name of their old city.

I will quote, in conclusion, what seems to me a parallel case. Pausanias says (IV. 27, 10), that the Minyæ of Orchomenus were expelled by the Thebans *after the battle of Leuctra*. We know very well that the power of Orchomenus was gone long before, but the increased strength of Thebes, and some offence on the part of the subject city during the struggle with Sparta, determined its complete extinction by the Thebans. But this was no great siege or subjugation of a free city. That had been done by the Thebans long before. So I believe the capture of the great fort at Mycenæ probably occurred long before the Persian Wars.

The explicit passage in Diodorus (xi. 65), which seems at first sight a conclusive corroboration of the ordinary view, only strengthens my conviction that it is wrong. Diodorus is precise about the date. He says that in the 78th Ol. (468-4), while the Spartans were in great trouble on account of a destructive earthquake and rising of the Helots and Messenians, the Argives took the opportunity of attacking Mycenæ. But they did so because Mycenæ *alone of the cities* in their territory would not submit to them. This distinctly asserts that all the other towns, such as Tiryns and Midea, had been formerly subdued, and contradicts Pausanias. Diodorus then enumerates the various claims of Mycenæ to old privileges about the Heraeum and the Nemean Games, and adds what Pausanias says about their joining the Greeks at Thermopylæ, alone among the Argive cities. The share taken by Tiryns with Mycenæ at Plataea seems unknown to both authors. But after long waiting for an opportunity, the Argives now collected a considerable force from Argos and the allied cities, and made war upon Mycenæ—upon Mycenæ, which was only able, jointly with Tiryns, to supply 400 men at Plataea, and which, when unaided, sent 60 men to Thermopylæ! The Argives first defeated them in battle, and then besieged the fortress, which, after some time, through lack of de-

66 CAPTURE OF MYCENÆ BY THE ARGIVES.

fenders (which is indeed credible), they *stormed*. Here again Pausanias is contradicted. Diodorus concludes with stating that they *enslaved* the Mycenæans, consecrating a tenth of the spoil, and levelled the town with the ground.

I think my theory is perfectly consistent with the critical residue which may be extracted from this passage. It is probably true that the Argives chose the opportunity of a Messenian war to make this conquest, but it was the second, not the third, Messenian war. It is probably true—nay, I should say certainly true—that they levelled Mycenæ with the ground in the 78th Ol. ; but this was not their first conquest of it. If they enslaved the then inhabitants, this harsh measure was probably by way of punishment for the impertinence of a subject town in sending an independent contingent to a war in which the sovereign city had determined to maintain a strict neutrality. That the facts related by Diodorus should have caused no general comment throughout Greece, or that no echo of it should have reached us, seems to me almost incredible. There is a possible corroboration of Diodorus' statement that Mycenæ was the last conquered of the subject cities in the Homeric Catalogue, where Tiryns is mentioned as already subject to Argos, while Mycenæ is the capital of Agamemnon. But even when that Catalogue was compiled, Argos had conquered all the seaboard of the Argolic peninsula, and Mycenæ lies at the extreme south of the territory (chiefly Corinthian and Sicyonic) which is assigned to Agamemnon. Possibly the traditions were still too strong for the poet to make Mycenæ subject to Argos, but he plainly denies any hegemony of Mycenæ over the Argive plain.

J. P. MAHAFFY.

THE CORRESPONDENCE OF FRONTO AND
M. AURELIUS.

THE year 1815, amidst the absorbing excitement of its political and military events, witnessed a singular instance of a literary resurrection. A rumour had become rife that Cardinal Angelo Mai, then an official of the Ambrosian library at Milan, had made what was expected to prove a most important discovery, and was about to issue from the press, in two volumes, the literary remains of Fronto, including correspondence between that rhetorician and no fewer than three of the Cæsars who wore the purple during his long lifetime. Among the scholars of Germany immense interest was excited by this intelligence. It was remembered what light the letters of Pliny had thrown on a preceding age; and a wealth of illustration of the same sort was expected in the African master of the second century. Little enough had hitherto been known of Fronto: but complimentary allusions to his writings existed in the Latin grammarians: Minucius Felix had preserved a highly appreciated fragment of an unsparing onslaught on the Christian Church; another had praised his style for its *siccitas*, a third for its *pompa*: Eumenius had epigrammatically hailed in him *Romanæ eloquentiæ non secundum sed alterum decus*: and (weightiest testimony of all) the noble Aurelius had assigned him a niche in the gallery of worthies immortalised in the first book of his *Meditations*.

But this highly-wrought expectation was doomed to disappointment. Two causes may be assigned. The garb in which Fronto was first presented to modern readers was

disorderly to the last degree. So careless had been the editorial supervision of Mai, that his edition was hailed by the savants of Germany with a perfect chorus of disapprobation. We hear indeed an occasional sentence urging the excuse of extenuating circumstances, and not without reason. The palimpsest which had originally contained the remains of Fronto along with parts of Symmachus, Pliny's *Panegyric*, and certain scholia on Cicero, was covered with an account of the Acts of the Council of Chalcedon. The pages were fragmentary and disarranged. Even after the application of strong chemical agents, the writing was barely legible. But Mai, growing tired of telling—to use a phrase of Conington's—both the “dream and its interpretation,” presently committed the task of consulting the MS. to a subordinate; and shortly afterwards, being appointed Librarian of the Vatican, betook himself to Rome. Germany, however, was on the watch. Even before Mai's volumes had appeared, three notable men—Niebuhr, Buttmann, and Heindorf—formed the design of re-editing the work, should it prove of any value. In this respect indeed their hopes were extravagantly high; and it is almost amusing to read the tale of their disappointment in Niebuhr's preface. Fronto was so far from being a second Cicero! Even scraps of fresh information could be gleaned from him in such small quantities! Presently, however, the clouded brows of the three collaborateurs relaxed into a smile—*quærela in risum soluta est*, says their chief—and they resolved, though Fronto might not prove all that they had fondly dreamed, at least to present him to the public in as intelligible a form as might be. But haste was necessary, that the book might be ready for the great annual fair at Leipsic in 1816. Not long afterwards Mai discovered in the Vatican Library another piece of the same palimpsest, making in all 286 pages. Incorporating many of the results to which Niebuhr had been led by the insight of

genius, he brought out all in a new edition at Rome in 1823. At this the wrath of Germany again exploded. Not only had the Cardinal printed Niebuhr's conjectures as actual readings authorised by the MS., without any notification to the reader, but even adopted visionary corrections of theirs which had no other foundation than his own original mistakes: thus producing a confusion twice confounded. Though individual passages in large numbers were emended by various critics, no fresh collation of the palimpsest was attempted till 1867. A Dutch scholar named Du Rieu investigated even the pages where the writing, owing to the effect of the Cardinal's chemical agents, seems to have vanished for ever. On his return, he communicated the results to S. A. Naber, whose edition is a vast improvement on its predecessors. The emendations of many earlier critics are incorporated, notably those of Eckstein and Haupt: while selections from the first of three pamphlets published at Dublin (1841, 1863, 1867) by Henricus Alanus are given in the Addenda. Since then Professor Robinson Ellis has thrown light on several dark places in the *Journal of Philology*, Vol. I., No. 1. But a more substantial contribution is the joint work of two Germans. Of the *Emendationes Frontonianæ* of Klusmann and Studemund (Berlin, 1874) it is not too much to say that they are a perfectly indispensable supplement to Naber's edition. The fresh collation of parts of the palimpsest by the latter, together with the insight of the former, have cleared up difficulties which in Naber remain absolutely inexplicable, and many of Klusmann's corrections commend themselves at once and finally to the judgment of the reader.¹

¹ The all but exhaustive bibliography of Frontonian criticism in Klusmann's opening pages omits two items contributed by France; the first of which is

also unknown to Teuffel (§ 351, 9 *sqq.*) It is a reprint of Mai's Roman edition, with original notes and a French translation opposite the text, by Armand

Such is a sketch of the recent history of these Letters, which I for one, notwithstanding the grave indictments of their foreign expositors, have found extremely interesting. Let us hear the worst that can be said of Fronto at once. "Novi," says the Dutch editor in his Prolegomena, "quid de eius admirabili eloquentia æquales iudicarint et posterī nimis facile crediderint; sed, fateor, Frontonis flosculos et imagines et inanes tinnitus non amo, et, si verum dicendum est, contemno. Profuisset hominis existimationi, si operum reliquæ e codicibus palimpsestis nunquam erutæ fuissent." "Præter Italum, qui inventum suum exosculabatur, nemo fuit quin agnosceret in Frontone corruptam eloquentiam et in æqualibus corruptum iudicium." Not even Mai has a word to reply to Niebuhr when he complains: "Ita sententiis et rebus nondum notis vacuum, ita levem et indisertum quin sæpenumero putide delirantem in his quidem scriptis Frontonem invenimus ut . . . cum Silio Italico numerari debeat." These are severe judgments, yet not without grounds. Of affectation, of false taste, of evidence of what M. Suckau calls *la chasse aux syllabes*, there is unfortunately too much. A fixed idea with Fronto is the all-importance of the *form* of the expression. An orator (he is never tired of telling Marcus) ought not to content himself with a *good* word; he must not be satisfied until the one *best* word presents itself. Everyday forms of speech are set aside in favour of *recherché* and archaic expressions. An excellent passage of Cicero is

Cassan, Paris, 1830. The translation is, I fear, quite worthless. Wherever any real difficulty occurs, M. Cassan either goes wrong or has recourse to asterisks. Yet this is the shape in which such careful writers as Suckau (*Étude sur Marc-Aurèle*) and Noël des Vergers (*Essai sur Marc-Aurèle*), as well as Pierron,

are content to make Fronto's acquaintance. Klussmann's second omission is that of a singularly charming study of the relations between Aurelius and his tutor, which appeared in the *Revue des Deux Mondes* for April, 1868, by M. Gaston Boissier, and of which I have made some use in the following pages

condemned for furnishing so few choice phrases.² Poverty of vocabulary, as he understands it, is in Fronto's eyes the unpardonable sin; and the word *Tullianus*, which he occasionally deigns to use, has always in his pages a slightly contemptuous sense attached to it. This is quite the taste of the clever school-boy, whose powers of thought lag behind his powers of expression; and which, when found in later years, is justly termed pedantry. How this style of oratory proved so successful at the Roman Bar is surprising, until we reflect that Fronto is herein but an advanced exponent of the degraded taste of his age—an age which could see no beauty in Virgil or Livy, but dwelt with morbid admiration on the obsolete diction of Varro and Cato.³ One may go farther, and even confess that there is hardly a single strikingly original idea nobly expressed in the compass of the whole volume. At p. 144, ed. Naber, we seem at first sight to have discovered the proper ownership of a thought since polished and set by the perfect art of Milton:—"Novissimum homini sapientiam colenti amiculum est gloriæ cupido." Even although this is weakened by the repetition immediately following:—"Id novissime exuitur," it is not unworthy to be set beside the lines we know so well:—

"Fame is the spur that the clear spirit doth raise
(That last infirmity of noble mind)
To scorn delights."

Tacitus is an author to whom Fronto never once alludes. But that he had read the *Histories* to some purpose

² Fronto's estimate of Cicero may be found in Naber's ed. p. 63. He complains that "in omnibus eius orationibus paucissima admodum reperias in-sperata atque inopinata verba, quæ

nonnisi cum studio . . . atque—multa veterum carminum memoria indagantur."

³ Cf. Friedländer, *Mœurs romaines*, (French transl.), iv., 14, 15.

is evident from the coincidence of language :—"Etiam sapientibus gloriæ cupido novissime exuitur."⁴

The main interest of these letters lies in another direction. It is in the light which they throw on the early years of M. Aurelius, and the illustration of some few points in the *Meditations*, which may be thence incidentally derived. Since the discovery of Fronto's remains, no annotated edition of the text of the Emperor has anywhere appeared. Gataker's monumental work—one of the chief triumphs of English scholarship—came out in 1652. Though there is reason to suppose that Schultz prepared a commentary, it has never been given to the world. His editions of the text are dated 1802, 1820 and 1849—the last being, as is not generally known, in Didot's collection. Nor does the work of Adamantinos Koræes, dedicated, in 1816, with a modern Greek preface,⁵ to the young men of the isle of Chios, contain any notes whatever. On the other hand, both Long and Pierron occasionally comment on the text they translate so well. There is little reference to Fronto in either.

In the *Meditations* themselves we become acquainted only with the last phase of the development of the Emperor's inner life. We see it in its fulness and strength—we see it; if I may borrow the expression of M. Suckau, "*toute entière recueillie en face de la mort, dans l'achèvement d'une vie noble et bien remplie.*" They are purest expression of

⁴ Naber cft. Plut., iv. 6. *An seni resp. ger.*, p. 783 D.—The coincidence of Tac. and Milton had been noticed by Lecky, *Hist. Eur. Morals*, i., 184, note.

⁵ As the book is both in itself interesting and extremely rare (I could not find a copy in the British Museum), a specimen of the dedication may be quoted. ΠΡΟΣ ΤΑ ΧΙΑ ΜΕΙΡΑΚΙΑ.—Εἰς ἐσᾶς, εὐτυχῇ τῆς Χίου μεῖράκια, προσφωνῶ τοῦ

μεγάλου ἀνδρὸς καὶ Αὐτοκράτορος τὸ πολύτιμον τοῦτο σύγγραμμα. Σᾶς ἐπρότιμῃσα παρὰ τοὺς συνηλικιώτας ἑλλοὺς "Ἕλληνας, ὅχι ὡς ἀξιοτέρους ἐκείνων, ἀλλ' ὡς τρέχοντας μεγαλήτερον κίνδυνον νὰ φανῇτε καταφρονηταὶ τῆς προνοίας τοῦ θεοῦ· ὅστις, ἐπειδὴ σᾶς ἐχάρισεν ἀρετῆς μέσσα πλειότερα, καὶ κάρπους αὐτῆς δικαίως πλειότερους ζητεῖ καὶ προσμένει ἀπὸ σᾶς.

a great man's character; but of his external circumstances they tell us little. Now it is just here that his correspondence with Fronto proves so interesting. It furnishes us with a charming picture of a naturally serious, yet cheerful and sunny boyhood: and again, after an interval of many years, the letters interchanged during which have disappeared, with pleasant glimpses of family life in villa and palace, both before and after Marcus became actually Emperor. The young man who was about to become Fronto's pupil in Latin eloquence had the good fortune not to be born in the purple. As no one could have suspected his future eminence, it was not the interest of any to flatter him in early years. In youth the truth was spoken to him, and the love of truth became a marked feature in his character. "Am I to be congratulated," he writes to Fronto, "because I have some one to teach me how to dress out an idea, to make the most of a metaphor? non hoc est quod me felicem nuncupo. Quid est igitur? quod verum dicere ex te disco."⁶ Elsewhere he exclaims: "Quid ego de tuis litteris dicam benignissimis, *verissimis*." .⁷ In one of his Greek letters—in using which language the aged African claims indulgence, as being (like Juvenal's mice a member of the ubiquitous tribe of the *Opici*⁸—Fronto declares that were he a door-keeper at some great festival, and entrusted with the power of refusing admission to the unworthy, the first to be excluded should be *whosoever loveth and maketh a lie*; in the Homeric phrase of the origi-

⁶ Naber, p. 49.

⁷ Naber, p. 55.

⁸ "Epistolam matri tuæ scripsi, quæ mea impudentia est, græce . . . Tu prior lege, et si quis inerit barbarismus, tu qui a græcis literis recentior es, corrige, atque ita matri redde; nolo enim

me mater tua ut *opicum* contemnat."

—Naber, p. 24. But Marcus is equally humble about his Greek, and says (p. 31), "Me *opicum* animantem ad græcam scripturam perpulerunt homines, ut Cæcilius ait, *incolumi inscientia*."—Cf. p. 44.

nal, ἕτερον μὲν τι κευθούσας ἐνι φρεσίν, ἄλλο δὲ λεγούσας.⁹ In the most pathetic of his writings, the tract on the loss of his grandson, Fronto says with manly brevity, "I have done my best to speak the truth, and never shirked hearing it. Verum dixi sedulo: verum audiui libenter."¹⁰ We see what atmosphere was breathed by the prince in the society of at least one friend whom he afterwards credited with showing him "what . . . *duplicity* and hypocrisy are in a tyrant"¹¹—a prince whom Hadrian, in allusion to his original name, loved to call by the gracious superlative Verissimus; a prince who was one day to inscribe this sentence in his private note-book: "Let all your words have an accent of heroic truth."

If sincerity was one prominent feature in the character of Fronto, warmheartedness was another. His correspondent is never weary of reminding him of and glorying in their mutual attachment. In speaking to Marcus of Hadrian, whose reserve was due to pride or age, Fronto confessed that he was not at ease in his presence; but "regarded him rather as a deity to be propitiated than as a man to be loved."¹² With the younger Cæsar no such barrier existed. No official etiquette prevented a full and unreserved expression of feeling on either side. Sometimes it reaches a height which (like the unexpected revelations of love-letters in an English law-court) is more calculated to raise a smile than excite admiration. Hardly a letter of the shortest dimensions passes without ending in a series of the strongest superlatives. Open the volume anywhere, and you will find appellatives like *magister dulcissime, melitissime, iucundissime, mea lux, meus spiritus, mea voluptas,*

⁹ Naber, p. 243. Fronto goes on to observe, with a veracity which verges on impoliteness, *γυναικεῖα δὲ τις αὐτῇ θεὸς παρὰ ταῖς πλείσταῖς τῶν γυναικῶν θρησκέβεται ἢ Ἀπότῃ*. The letter is ad-

dressed Μητρὶ Καίσαρος.

¹⁰ Id., p. 235.

¹¹ M. Aurelius, i. 11.

¹² Naber, p. 25.

meum desiderium. For a moment Marcus yielded to the morbid taste of the age for exaggeration. A French critic has grounds for saying that he finds occasionally in these letters an indefinable *couleur grecque qui ressemble à du fard*.¹³ But after every deduction is made, a solid basis of indestructible sincerity remains : and Marcus had no truer friend than the old Numidian. In commending to Marcus' colleague a valued acquaintance named Clarus, Fronto uses the following remarkable expression to sum up his character : "Simplicitas, castitas, veritas ; fides Romana plane, φιλοστοργία vero nescio an Romana ; quippe qui nihil minus in tota mea vita Romæ repperi quam hominem sincere φιλόστοργον : ut putem, quia reapse nemo est Romæ φιλόστοργος, ne nomen quidem huic virtuti esse Romanum."¹⁴ What is to be observed in this passage is that, though unique as far as the sentiment is concerned, it exactly coincides with the brief notice of Fronto in the Emperor's *Meditations*. "He showed me that generally those among us who are called Patricians are rather deficient in warmheartedness : *ὅτι ὡς ἐπίπαν οἱ καλούμενοι οὗτοι παρ' ἡμῖν εὐπατρίδαι ἀστοργότεροί πως εἰσὶ*."¹⁵ It was the quality which Aurelius valued most in Fronto. The word occurs again, p. 231, "Vale, φιλόστοργε ἄνθρωπε."

The strength of this prince's attachment to his master

¹³ Suckau, p. 10.

¹⁴ Naber, p. 135. Even from the worthless voluptuary to whom the letter is addressed Fronto's warmheartedness and sincerity (if we may take Lucius Verus' word for it) had called forth a response. "Simulare Lucium quicquam adversus Frontonem, a quo ego prius multo simplicitatem verumque amorem quam loquendi polite disciplinam didicisse me prædico !" — Naber, p. 130. But the whole passage

rings false, and it is to be feared that *verus amor* is scarcely yet διδακτός.

¹⁵ In translating "those who are called patricians are deficient in paternal affection," Long seems to indicate a play upon words of which there is no trace in the original. Schultz does the same, in rendering "Patricios . . a genuino paterni amoris adfectu . . alienissimos." This is one of Schultz's "improvements" on the version of Gataker.

of Latin eloquence may be measured by the genuine efforts, contrary to the bent of his nature, which he made to give the Frontonian scheme of education a fair trial: to hold the power of verbal expression above all others. For philosophy was his real vocation. Already, at the age of twelve, he had begun to practise the austerities of Stoicism, and live the life of an ascetic. It is Diognetus whom he thanks for inspiring him when a boy with the "love of the *σκήπτρον* and *δορά*, with the other accessories of Grecian discipline."¹⁶ "Tantum operis et laboris studiis impendit," says Capitolinus, "ut corpus adficeret; atque in hoc solo pueritia eius reprehenditur."¹⁷ But Fronto was a rhetorician—and a rhetorician firmly convinced that nothing in the world was more important to a prince than rhetoric. At the time when the correspondence opens, if Naber¹⁸ be right, Marcus had just been associated in the Empire, and was already distracted by the grave cares of office. Nevertheless Fronto could not refrain from sending his ex-pupil from time to time a little theme or thesis to develop, just to keep his hand in. "C'était le travers," says Boissier, "de cette education oratoire des Romains d'être éternelle. On exigeait de l'orateur tant de qualités différentes et une telle diversité de perfections qu'il n'était jamais tout à fait formé et qu'il lui fallait étudier toujours." Probably no one was at that time astonished at seeing a prince of twenty-two still doing exercises, but it makes one smile to read the record now. "I sent you a subject," says Fronto: "it is a serious occurrence. A consul of the Roman People lays aside his robes, puts on a gauntlet, and slays a lion in sight of the whole assembly at the Quinquatria: *Διασκεύασον, αὔξησον*."¹⁹ Aurelius replies: "When did the event

¹⁶ *Med.* i. 6.

¹⁷ *M. Ant., Phil.* 3.

¹⁸ At p. xx he assigns what he supposes to be the earliest letters of the

series (*ad M. Caes. III.*, 1) to the year 139, when Fronto was 50 years of age.

¹⁹ Naber, p. 82.

occur? was it at Rome? Do you say it happened under Domitian at Alba? Besides, with a subject like this, it would take more time to make the fact credible than to develop it. It seems to me an ἀπίθανος ὑπόθεσις. Though I should have preferred one such as I had requested, write to me at once about the date."²⁰ Fronto's naïf delight at his august pupil's success comes out occasionally. "My daughter Gratia came last night," he writes. "But it almost did me as much good that you should have turned the γνώμη so capitably—that indeed which reached me to-day so nearly to perfection that it might be introduced into a chapter of Sallust's, and no difference or inferiority be detected. Ego beatus, hilaris, sanus, iuvenis denique fio, quum tu ita proficis. . . . Please God, when you get back all right to Rome, you shall do verses for me again every day."²¹ What is meant by a γνώμη may be gathered from other parts of the correspondence. Equally important was the εἰκὼν, ever on the lips of Fronto. Marcus begs for advice on the best use to be made of a happy thought. "This afternoon I accomplished something as I lay down since one o'clock: I worked up about ten εἰκόνας. At three

²⁰ Id., p. 82. The end of this letter contains in the palimpsest a riddle which no one has yet solved. Let me add one to the many attempts already made. Naber prints: "Ἀπίθανος ὑπόθεσις videtur mihi, quod plane BALUCEIS, qualem petieram. Rescribe statim de tempore." He supposes that under the *monstrum* in capitals lurks some Greek word; acting upon which suggestion Klussmann, with moderate probability, proposes ἀλόσκεῖς. But the hypothesis of the true reading being a Greek word at all is unnecessary. In these Letters B is constantly written by the scribe for V. We find *venia*, *vibo*, *virtus*, *voluntas*, etc., at every page.

Quod and *Quom*, moreover, are often confused: v. pp. 80, n. 1, 67, n. 7, 127, n. 8. Under these circumstances, we may, perhaps, changing the punctuation, restore "*Quom plane VOLUERIM, qualem petieram, rescribe statim de tempore*," in the sense of the translation given above. But if any one should prefer MALUERIM, I shall not object. Schopen, evidently considering the πῆμα to be τομὴν, applies a heroic remedy. For the three words *quod plane baluceis* he writes *non ubi clamare liceat*. It cannot be said that Germans are wanting in courage.

²¹ Naber, p. 48.

o'clock I find myself forced to call you in as adjutant²²—the inspiration had deserted me. The point is this. In the island of Aenaria there is a lake, and in this lake another inhabited island : "Ενθ' ἐμὴν δ' εἰκόνα ποιοῦμεν. Vale, dulcissima anima."²³ Fronto promptly rejoins : "Suppose you apply your metaphor to your own position in the empire with reference to your father Antoninus ? On the outer island (wherever it is) beat waves and storms, while it keeps the inner islet in its lake in perfect peace and security—item pater tuus imperii romani molestias atque difficultates perpetitur, te tutum intus in tranquillo sinu suo . . . honorum omnium participem tutatur. You might make something of this in a speech of acknowledgment to your father—a subject on which you ought to be always ready to enlarge." And Marcus is treated to a lengthy list of all possible genera and species of εἰκόνες, by way of conclusion. The disinterested faith of Fronto in his art is indeed touching. Day and night his soul is in travail for his pupil's deliverance. "You think I have been asleep," he writes elsewhere ; "no : I have scarcely been able to close my eyes all night. I kept wondering whether indulgence had not blinded me to your want of progress and your faults : whether your not being farther on and better built up in Eloquence is not due to natural idleness or negligence on your own part." This self-examination ends in a melancholy discovery, and he bethinks himself of an important omission in his teaching—he takes himself bitterly to task for not having induced Marcus to lay the founda-

²² "Nona te socium et optionem mihi sumo."—H. Alanus has anticipated me in comparing Plaut., *Asin.*, i., 1, 88, "tibi optionem sumito Leonidam." Marcus owed his Plautine acquirements to Fronto, with whom the comic poet was in high favour, on the ground of his antiquity and extensive vocabu-

lary. *Vide* Naber, p. 62. We even find the word *Plautinotato* (p. 156), which Studemund (ap. Klussmann, xxxii.) has admirably restored for *plautinotrato*, the source of numberless conjectures.

²³ Naber, p. 45.

tions of his study of the *genus demonstrativum*²⁴ deeper. "Sed, quod mihi tum demum venit nocte media in mentem, qualem ὑποθεσιν scribis! nimirum ἐπιδεικτικήν, qua nihil est difficilius. Cur? quia cum sint tria ferme genera ὑποθέσεων (ἐπιδεικτικῶν, συμβουλευτικῶν,²⁵ δικανικῶν), cetera illa multo sunt proniora, multifariam procliva, vel campestria; τὸ ἐπιδεικτικὸν in arduo situm. Denique cum æque tres quasi formulæ sint orationis, ἰσχνόν, μέσον, ἀδρόν, prope nullus in epidicticis τῷ ἰσχνῷ locus, qui est in *dicis* multum necessarius."²⁶ Happily, however, all may yet be well. Only let Marcus' daily regimen of reading be changed—changed, for instance, from old comedy, which tends to foster a simple style, to *pompaticæ orationes*. "Let us do our very best," urges the master: "I engage, I take it upon myself, I will be answerable, that we shall have you at the top of the tree of Eloquence directly. Heaven is on our side: the Gods will help us." Do what we will, it is impossible not to be amused at this misplaced zeal. Such, however, was Fronto's own strength of conviction that he

²⁴ So Quintilian (iii. 4) translates ἐπιδεικτικόν.

²⁵ Supplied by Haupt.

²⁶ Naber, p. 54. The word DICIS I have myself substituted for the MS. reading DICIA, which Naber still prints. Anyone who opens these Letters will be struck by two features of the Frontoian style: the habit of mixing Greek and Latin together, the former being frequently written in Roman characters:—prothymia, pannychio, metectoria, pseudomenus, in hac eikore, for instance; and the special love of Plautinisms, of which Studemund has collected two pages (xx. sq.) Of Greek Plantinisms *dica* is a well-known specimen. "There are three kinds of ὑποθέσεις" (Fronto is saying) "and three kinds of style: the ἰσχνόν, the

μέσον (Quintilian's ἀσθηρόν, xii. 10) and the ἀδρόν. Now for the ἰσχνόν, your previous reading has mainly fitted you. For this style, however, there is no room in *epidicticis*, which yet is so necessary in forensic practice, IN DICIS" (i. q. δίκαις, like *epidicticis* in the preceding line). This is a smaller change than any yet proposed. "Omne oratoris officium," says Quintilian (iii. 4), "aut in iudiciis est aut extra iudicium." He then goes on to distinguish the genera and species orationis, some of which are enumerated above. Fronto prefers expressing his meaning in Greek. In *dicis* will then mean the same thing as in *dicanicis*, which Haupt would restore, but from which it is not so easy to see how *dica* could have arisen.

ended by convincing. Marcus threw himself into this path of study again with so much ardour as to alarm his family. The works of Cato the Elder aroused his special admiration, and it is to be hoped that he carried away from the sound and manly freshness of that early literature something better than obsolete and archaic expressions to restore to fashion. Nothing pleased him more than to find something in Fronto's speeches which reminded him of Cato, or one of Cato's contemporaries. Then he bursts forth into strange transports. "O te hominem beatum hac eloquentia præditum! . . . ο ἐπιχειρήματα! ο τάξεις! ο elegantia! ο lepos! ο venustas! ο verba! ο nitor! ο argutia! ο kharites! ο ἄσκησις!" ending with a truly Whitmanic touch, "ο omnia!" And nothing will satisfy him but crowning Fronto, with sceptre and diadem, king of the republic of letters.²⁷

²⁷ Naber, p. 28. Cf. Boissier, p. 682. The fullest expression of Fronto's doctrine of words may be found in his letter *ad M. Caes.* iv. 3; Naber, p. 61. It contains an estimate of the various Roman writers in respect of 'style,' that is (being interpreted) of richness in archaic and rare phraseology. Cicero we have seen condemned for not employing "unexpected" words. "Inspiratum atque inopinatum vero appello, quod præter spem atque opinionem audientium aut legentium promitur: ita ut si subtrahas, atque eum qui legat quærere ipsum iubeas, aut nullum aut non ita ad significandum accommodatum verbum aliud reperiatur. Quamobrem te magno opere conlaudo, quod ei rei curam industriamque adhibes, ut verbum ex alto eruas et ad significandum accommododes" (p. 63). And elsewhere Fronto acknowledges still more directly that his teaching had taken effect. "Scis

verba quærere, scis reperta recte collocare, scis colorem sincerum vetustatis appingere, sententiis autem gravissimis . . . abundare" (*De Eloquentia*, p. 152). It would be interesting to inquire how far the subsequent style of Aurelius was really modified by Fronto. Curiously enough, the very same remark as that last quoted is made by Herodian, *Hist.* i., 1., 'Ο βασιλείων Μάρκος . . . λόγων ἀρχαϊότητος ἢ ἐρρύσσης, ὥς μηδένας μήτε Ῥωμαίων μήτε Ἑλλήνων ἀπολείπεσθαι. The large and rare vocabulary used in the *Meditations* was noticed by the Lyons commentator. "Utitur vocibus plane suis, quas raro apud alios auctores invenias." Of such ἀπαξ λεγόμενα, without aiming in the least at exhaustiveness, I have had no trouble in making a list half a page long. But, in all other respects, the philosophic style of Aurelius differs *toto calo* from the Frontoian ideal.

But the reaction was not far off. During this hot-house period of tropes and rhetoric, Aurelius had cherished philosophy deep in his heart, and Fronto had been instinctively aware of the danger. It needed but a spark to kindle it again. This was applied by a personage whose acquaintance he seems to have now made. Rusticus the Stoic was in every particular the reverse of Fronto. A man of outspoken candour and difficult temper, Rusticus pointed out shortcomings where Fronto applauded. He did not care to disguise his opinion of the prince's literary pursuits. Marcus had written various copies of verses under the direction of Fronto, who thought they tended to improve style.²⁸ "It is very kind of you to ask for my hexameters; I should have sent them at once had I had them by me. My librarian Anicetus, however, sent none of my own productions with me when I left: knowing my weakness for putting them into the fire. But *those* hexameters were in no danger: to tell you the truth, I like *hem*."²⁹ "I now feel the advantage of polishing four or five lines a day."³⁰ He was the last of that remarkable and all but continuous series of poet princes³¹ which had begun with Augustus, the author of the *Ajax*, who "fell upon his sponge." But Stoicism was as intolerant of the fuses as is Mr. Carlyle. Rusticus mocked at the imperial verses and the rhetoric which it was expected they would civilitate. So much care spent on chiselling expressions seemed to his stern philosophy entirely worthy of contempt. Rusticus saved me," the emperor acknowledges, "from being led astray into the rivalry of sophistic disputation . . . from delivering short hortatory speeches; from keeping up my study of rhetoric and poetry, and aiming at clever talk-

²⁸ Cf. Naber, p. 54.

²⁹ Page 34.

³⁰ Page 253.

³¹ Cf. Friedländer, *Mœurs Romaines*, iv. 63.

ing.”³² It seems that this was done with a rough candour which showed small consideration. Even the sweet nature of Aurelius sometimes resented it. Elsewhere, he admits that he was “often out of humour with Rusticus,” at the same time adding that “he never did anything to repent of.”³³ Beside the well-meaning affectation of Fronto’s style, Marcus’ letters had been in comparatively pure taste. Yet his regard for the orator led him unconsciously to imitate his literary faults, and a metaphor now and then appears which savours of the sophist.³⁴ One day he came across a letter of Rusticus to his mother, the natural simplicity of which was a sort of revelation.³⁵ Was it about this time that he wrote, “Cum aliquid pulcrius elocutus sum, placeo mihi, ideoque eloquentiam fugio;”³⁶ words which have something of that exquisite moral refinement already about them which he was afterwards to show here and there in the *Meditations*? But Fronto would not loosen his hold so easily. Again and again he expostulates with the prince; he dedicates a whole treatise to the subject,³⁷ in which he goes as near as he possibly can to losing his temper, and resorts to every argument and the strangest metaphors. The Rostra no longer echo to the voice of Cato and Gracchus. The eloquence of the whole empire has but a single mouthpiece—its prince. “Orbem terræ, quem vocalem acceperis, mutum a te fieri”—can he endure such a result? “Si linguam quis uni homini exsecet, immanis habeatur; eloquentiam humano generi exsecari

³² M. Aurelius, I, 7—Παρά 'Ρουστίκου τὸ μὴ ἐκτραπήναι εἰς ζῆλον σοφιστικὸν . . . μὴδὲ προτρεπτικὰ λογάδια διαλέγεσθαι . . . καὶ τὸ ἀποστήναι ῥητορικῆς, καὶ ποιητικῆς, καὶ ἀστειολογίας.

³³ I, 17.

³⁴ An instance of concession to Frontoian taste may be found in Naber's

Ed. p. 67: “Quum videbis in dolio mustum fervere, in mentem tibi veniat, mihi sic in pectore tuum desiderium scatere et abundare et spumas facere.”

³⁵ M. Aur., I, 7—τὸ τὰ ἐπιστόλια ἀφελῶς γράφειν, ὅσον τὸ ὑπ' αὐτοῦ τοῦτου ἀπὸ Σινούστῆς τῇ μητρὶ μου γράφειν.

³⁶ Naber, p. 143.

³⁷ *De Eloquentia*.

mediocre facinus putas ?" It is the sin of Tereus, of Lycurgus.³⁸ But even these classical allusions fail to shake Aurelius. He thanks the Gods "that he did not make more proficiency in rhetoric, poetry, and the other studies in which he would, perhaps, have become completely entangled had he seen himself progressing in them,"³⁹ coupling the remark shortly afterwards again with the name of Rusticus.⁴⁰ The death-blow to Fronto's influence over his mental development remained to be given. In the *Discourses* of Epictetus, of which Rusticus presented him with a copy out of his own collection,⁴¹ the whole splendour of morality burst upon his view. The veil which had partially obscured his sight fell—and from that period his full Stoic *Aufklärung* is to be dated. Beside the strong meat of this teaching, all other pursuits seemed insipid. Henceforward he loved Fronto for himself alone ; it is noticeable that the obligation to him, acknowledged in after years, is exclusively a *moral* one. Not a word is said of the care so abundantly lavished on his style. Sincerity, truth, warm-heartedness—these are the qualities which make up the image he retained of the old master,⁴² whose bust doubtless had its place in the *lararium* of the Emperor.⁴³

Perhaps the very praises which Fronto showered on Aurelius tended to undermine his influence. To the last he believed that if his pupil did not become an irreproachable orator, it was the fault of his will, not of his genius. On his accession to empire, Fronto writes : "Video te, Antonine, Principem tam egregium, quam speravi; tam iustum . . . quam spondi; . . . tam mei amantem, quam

³⁸ Naber, p. 145.

³⁹ M. Aur., I, 17.

⁴⁰ The return to the same person, in what is ostensibly a regularly arranged list of acknowledgments, shows that the book consists of jottings written at different times, and never revised.

⁴¹ M. Aur., I, 7.

⁴² Id., I, II.

⁴³ "Tantum honoris magistris suis detulit ut imagines eorum aureas in larario haberet, ac sepulcra eorum aditu hostiis floribus semper honoraret." Capitol. M. Ant. *Phil.* 3.

ego volui; *tam disertum, quam ipse voluisti*. Crede hoc mihi, omnium hominum, quos ego cognoverim, uberiore quam tu sis ingenio adfectum comperisse me neminem."⁴⁴ But the candour of Rusticus admitted the shortcomings even of him whom Mr. Matthew Arnold calls "the unique, the incomparable Marcus Aurelius." From *him* Aurelius recorded that "he received the impression that *his* character needed moral improvement and discipline."⁴⁵ Notwithstanding his unsurpassed regard for the emperor, Rusticus never took the same view of his abilities as Fronto. "Ille meus Rusticus Romanus," writes the latter, "qui vitam suam pro unguiculo tuo libenter dederit atque devoverit, de ingenio tamen invitus et tristis ægre concedebat."⁴⁶ And this, one gathers from the tone of all he has written, as well as from isolated expressions, had always been the view taken by Aurelius himself. There is a virtue on which Christianity lays great stress, which Greek philosophy is often charged with having overlooked. In all the breadth and scope of Aristotle, Humility finds no place. And of all schools, Stoicism, with its defiant *αὐράρ-κεια*, its glorification of absolute human independence, seems at first sight to offer the least favourable soil for its cultivation. But a change was coming over the character of the system. Time was when the haughty attitude of philosophers had led them to confront armies on the brink of revolution, and brave the utmost wrath of a victorious emperor. The spirit of Cato had lived again in Thræsea and Musonius; Persius, the boy-soldier of Stoicism, had hurled at Nero the proud prayer, "Great Father of the Gods, inflict on tyrants no punishment save one: let them gaze on the face of Virtue, and pine that they have lost her for ever!" Since that time the caricature had appeared

⁴⁴ Naber, pp. 95, 96.⁴⁵ Naber, p. 96.⁴⁶ M. Aur. i, 7.

beside the reality; the Tartufe of philosophy had stolen the cloak of the genuine sage. Partly owing to the absurd pretensions of the sophists of the second century, culminating in the grotesque self-immolation of Peregrinus before the assembled Greeks at Olympia; partly perhaps to some *souffle errant du christianisme* which had begun to exercise an indirect influence upon it, even Stoicism shared in the general softening movement of civilisation. Many of its most rigid paradoxes gradually cease to be put forward; and it is one of the excellences of Aurelius that he developed the scattered seeds of the virtue of *ταπεινότης* in the best of his predecessors, till the tone of his work resembles that of St. James, if not St. John.⁴⁷ The extreme form that virtue assumes in some phases of Christianity is certainly not to be found in any philosophic system. The form it assumed in such men as St. Simeon Stylites, who refuse to see any germ of good in the "noblest work of God," and regard themselves as—

"From scalp to sole one slough and crust of sin,"

does not belong to Stoicism, and I, for one, do not greatly regret its absence. But its healthier form, which begins to appear in Seneca and Epictetus, modifies with its subtle influence the whole tone of Aurelius' work. It is shown in his absolute submission to the will of God, as manifested in the events of life, the course of Nature. He "gives himself up to Destiny, to make what she will of the texture of his life." "All that is good," he cries, "in thine eyes, is good in mine, O world."⁴⁸ It is shown in the deep

⁴⁷ The subject of Humility in Stoicism has been briefly touched upon (I know not whether for the first time) in that exquisite book, Martha's *Moralistes*, p. 64: "Toutefois on trouve chez les stoiciens une sorte d'humilité. Se soumettre sans murmurer aux lois éter-

nelles, céder à la volonté de la nature de Dieu, reconnaître sa faiblesse et son peu d'importance dans ce monde, voilà une espèce d'humilité qui souvent inspire Sénèque et qui remplit le livre de Marc-Aurèle."

⁴⁸ M. Aur. iv., 34 and 28.

sense of the littleness and frailty of human life—*ψυχρίσθαι, βαστάζον νεκρόν*.” “To Nature that giveth all and taketh all away, he that is instructed and modest says, Give what thou wilt—take what thou wilt away. And this he says not in a spirit of pride, but of subordination and loyalty towards her.”⁸⁰ It is shown above all in the humble estimate the writer forms of his own powers, as well as of his own position. And here the views of his manhood are illustrated by an interesting glimpse of his earlier mental history, which we get in a letter to Fronto. His feelings of habitual dissatisfaction with his own achievements had been brought into painful prominence by the works of Aristo. “*Aristonis libri . . . cum ostendunt quantum ab his melioribus ingenium meum relictum sit, nimis quam sæpe erubescit discipulus tuus sibi que suscenset, quod viginti quinque natus annos nihil dum bonarum opinionum et puriorum rationum animo hauserim. Itaque poenas do, irascor, tristis sum, ζηλοτυπῶ, cibo careo.*”⁸¹ “You will soon be dead,” he wrote afterwards in his note-book, “and you are not yet simple, nor tranquil of mind, . . . nor gentle to all men.”⁸² And connected with it is one of those traits of unassuming frankness and simplicity which make the character of Aurelius so loveable.—“Let those who can feel the beauty of spiritual refinement (says an admirable judge of the quality) read this, the reflection of an emperor who prized mental superiority highly.” “You can claim no admiration for keenness of intellect: admitted; yet there are surely other things the want of which you cannot charge upon Nature. See how many virtues you might display at this moment, in the case of which you can urge no plea of natural unfitness; . . . and yet you consciously satisfy yourself with the lower standard!

⁷⁹ M. Aur., iv. 41.

⁸⁰ Id., x. 14.

⁸¹ Naber, p. 75.

⁸² M. Aur., iv. 37.

Grumbling, stinginess, . . . complaisance, vaunting, restlessness of mind—are these forced upon you by any natural incapacity? I trow not. From all of them you might have been delivered long ago. Only, if you are *noticeably* below the average of intelligence, it is a matter requiring exertion; and you should by no means neglect it, or take pleasure in being dull.”⁵³ One more passage—which has to me a perfect music in the words—and the illustration of this subject is complete. “Through all changes of Nature I press forward, till the time come when I shall fall and rest—breathing my last breath into that air whence I daily draw it in, while my body shall fall upon that earth whence my father drew the germ of life, my mother the blood, my nurse the milk, that brought me forth and nourished me; that earth to which all these years I owe my daily food and drink; which bears me as I walk upon its surface, and abuse it for so many purposes.”⁵⁴ From the whole tone of his correspondence and *Meditations*, we may conclude that, notwithstanding his adherence to a system once proverbial for arrogance, the writer thinks of himself as Paul of Tarsus would have every man think of himself—soberly, in an impartial and natural way.

Merivale thinks the burden of Empire more than the sensitive student could bear.⁵⁵ No such suspicion, as far

⁵³ M. Aur., v. 5.

⁵⁴ M. Aur., v. 4.

⁵⁵ *History*, viii., pp. 337 and 349. Another remark of Merivale's with which I do not quite agree occurs at p. 367: “Even his *Meditations*, with their anxious and important scruples, seem to betray some want of decision, some littleness of view and purpose. We must smile at the fervour with which the wisest of princes exhorts himself to rise betimes in the morning.” He al-

ludes to M. Aur., vi., ὁρθροῦ ὅταν δυσ-
δυνας ἐξεγείρη, πρόχειρον ἔστω, ὅτι
ἐπὶ ἀνθρώπου ἔργον ἐγείρομαι. This is
precisely a subject on which the corres-
pondence throws quite an accession of
light. It seems that Aurelius was nat-
urally a heavy sleeper (“sum multi
somni,” he says of himself, Naber, p.
93). But in combating this weakness
he ran into the opposite extreme so as
to alarm his friends for his health, which
was generally feeble. Fronto is never

as I can discern, seems to have crossed his own mind, but that life weighed heavily upon him there is abundant evidence. Two means of escape were open to him. Of abdication there is no hint. He had been called to the office and work of a monarch by lawful authority: he was no self-constituted *τύραννος*: his throne had not been secured by a *coup d'état*. He looked, we may suppose, on his life-task as divinely imposed: he would serve his fellow-men with all his might, yet as one of themselves, *civiliter*, not from the platform of royalty. To use his own language, he took care "not to be *Cæsarised*, not to be dyed with that dye;"⁵⁶ he had "received" the purple "without arrogance," and was "ready to let it go."⁵⁷ Court life was eminently distasteful to him. Capitolinus tells us of the sadness which clouded his spirit at the first news of his adoption to the empire.⁵⁸ It was a lasting sadness. When Fronto wrote "*Fac te, Cæsar, ad sapientiam Cleanthis aut Zenonis posse pertinere, ingratis tamen tibi purpureum pallium erit sumendum, non pallium philosophorum soloci lana,*"⁵⁹ he alluded to the same feeling on the part of Aurelius, which afterwards dictated "Even in a palace life may be lived well," and, in one whose soul loathed the corruption amidst which he was forced to live, inspired the lyrical cry, "Come

tired of exhorting him to spare himself. "*Iam si bellum indixi ludo, otio, satietati, voluptati, at tu dormi saltem quantum libero homini satis est*" (p. 227). "*Si quicquam nos amas, dormi per istas noctes ut forti colore in senatum venias et vehementi latere legas.*" To which Marcus briefly replies—is the brevity due to exhaustion?—"Ego te nunquam satis amabo: dormiam" (pp. 77, 78). And that these exhortations were not fruitless, appears at p. 230: "*Dictatis his, legi litteras Alsienses meo tempore, mi magister, cum alii cenarent.*

ego cubarem tenui cibo contentus hora noctis secunda. Multum, inquis, exhortatione mea: multum, mi magister; nam verbis tuis adquevi, sæpiusque legam ut sæpius adquiescam." The effects of this rigour in early years may have been lasting, and produced the difficulties with which the emperor had to struggle in manhood. Cf. Naber, pp. 9, 10, 11, 12.

⁵⁶ M. Aur., vi. 30.

⁵⁷ Id., viii. 33.

⁵⁸ M. Ant., *Phil.*, 5.

⁵⁹ Naber, p. 144.

quick, O Death, lest perchance I too should forget myself!"⁶⁰

Another method of escape was common on the lips and not uncommon even in the practice of the men of his sect. But this is another of the modifications which Stoicism has undergone in the hands of the humane and gentle Aurelius. Suicide, which the older masters had glorified, and looked upon as the coping-stone of the system, is spoken of by the Emperor with doubtful utterance. It may not be pure fancy to suppose that this want of perfect adhesion to his philosophical guides may be partly due to his long familiarity with Fronto. To the African orator's unquestioning serenity and clear confidence in the ends of human life, the thought of self-destruction would have been absolutely alien. But Aurelius had not always succeeded in concealing his profound distaste for the society among which his lot was cast. His biographer tells us how his "*venerabilis morum et imitanda sanctitudo*"⁶¹ contrasted with the dissolute pleasures of Verus, when the latter sought his company. Philosophy had made him serious and grave, "*non tamen prorsus abolita in eo comitate, quam præcipue amicis . . . exhibebat, cum esset . . . sine tristitia gravis.*"⁶² Yet he takes himself to task for an excessive *gravitas* which may have grown upon him with years. "A lowering look is altogether unnatural: when it often appears, the usual expression of the face perishes under its influence, so that it can never be lighted up again."⁶³ While he was probably as yet only on the steps of the throne, Fronto had warned him of the danger. "*Nonnunquam ego te coram paucissimis ac familiarissimis meis gravioribus verbis absentem insectatus sum: olim hoc, cum tristior quam par erat in coetu hominum progredere, vel cum in theatro tu*

⁶⁰ M. Aur., v. 16, ix. 3; cf. vi. 12, and v. 10.

⁶² Id., M. Ant. Phil., 4.

⁶³ M. Aur., vii. 24.

⁶¹ Capit. Verus, 8.

libros vel in convivio lectitabas. . . . Tum igitur te durum et intempestivum hominem, odiosum etiam nonnunquam ira percitus appellabam. Quod si quis alius eodem te convivio audiente me detrectaret, æquo animo audire non poteram.”⁶⁴ When his best friend can write thus, what must the indifferent, the hostile, have occasionally felt? No care, no love for others could prevent *some* from wearying of his very goodness. To some that was a standing reproach, a living sermon to which they could not close their ears. Aurelius knew the danger well; and, before he breathed his last, put these pathetic words on record: “There is no man so fortunate as not to have some standing by his death bed who are glad at what is going to happen. Suppose he was a good and wise man: will there not be some one to say to himself, At last I shall breathe freely now that this schoolmaster is no more! Harsh, indeed, he was to none of us; but I felt that he condemned us silently. So much for a good man. But, in our own case, how many other reasons many a man has for wishing to be rid of us! Think of these things in your last hours, and you will be more content to go, saying to yourself, I am leaving a life in which my own familiar friends for whom I toiled, and prayed, and thought so much, even they wish me to depart.” It is, indeed, a “bitter seed” to “fling among mankind:” a view which most of us (it is to be hoped) can falsify from our own single experiences. Aurelius lived in a different age—his family life, to say the least of it, was not all that he might have wished. But his sweetness of disposition is unconquerable. He immediately goes on to add: “Yet do not leave them with less kindly feelings on that account; but continue as usual, well-pleased, contented and resigned.”⁶⁵ Well might his prosaic biographer kindle a little in describing the last

⁶⁴ Naber, p. 74.⁶⁵ M. Aur., x. 36.

moments of such a man as this, and speak of him as *diis vita ac morte coniunctus*.⁶⁶

Other interesting points remain. I should like to have quoted at length, in illustration of the tact of Aurelius in uniting his friends among themselves, his admirable letter to Fronto,⁶⁷ entreating him to spare the orator Herodes Atticus, against whom he had been engaged to plead. It is a model of grace and good feeling. Scarcely inferior is the tract of Fronto, *de Nepote Amisso*.⁶⁸ Towards the end of his life he was smitten with a heavy loss. Bowed down by a real grief, all his wonted affectation vanished, and nature re-asserted her sway. His letter to the Emperor, on this occasion, is the worthiest product of his pen. But considerations of space forbid me to do more than call attention to both. The whole correspondence deserves to be more widely read.

Only two autograph records of the noble Emperor remain to us. In his *Meditations* he is all the Philosopher: there the precepts of Stoicism—greatly as his native gentleness has modified them—still seem to stifle his free utterance. He will not allow his feelings and aspirations vent in other than the conventional channels that Epictetus traced before him. But in the letters of his youth and early manhood we see the reverse of the medal. The other half of his nature is revealed; the character is complete.

⁶⁶ Capit., M. Ant., *Phil.*, 18. ⁶⁷ Naber, p. 40. ⁶⁸ Id., pp. 231, *sqq.*

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“THE LEGEND OF IGOR’S RAID.”

An Old-Russian Song of the Twelfth Century.

THE work here translated now for the first time into English enjoys considerable reputation in Russia, which it is hoped the following pages will tend in some degree to explain and justify. The great number of foreign translations and editions to be found in Russian bibliographies shows that this reputation is not confined to Russia, but that other nations have felt something of the charm, and been carried away by the naïveté and expressiveness of the old writer who composed this *bylina*, this tale of the days of old. It is unnecessary to give here any detailed account of these editions. The latest of the Russian editions, as far as I know, is that of Ogonovski¹ [1876], which is accompanied by a close translation in the dialect of Little Russia. As this edition is furnished with an apparatus criticus of various readings of the editio princeps and the copy of the original to be hereafter mentioned, and as it has,

¹ “Slovo o pŭlku Igorevê,” text with translation and notes, by Omelian Ogonovski; *Lemberg*, 1876.

The edition of Nikolai Tikhonravov, *Moscow*, 1868, is a scholarly work, by which I have endeavoured to profit.

Of other editions, hardly any has been of such service to me as the Bohemian of Hattala [*Prague*, 1858];

my translation is probably coloured, however, to some extent by the little edition of Hanka [*Prague*, 1821], in which I first read the work: it rejoices in a most exasperating printed character, nearly as bad as some of the phonetic experiments on English in our day.

besides, the advantage of excerpting almost all that has been said of importance on text or interpretation, I have made it the basis of this essay at translation, adopting also the Editor’s divisions of the text. The text is not certainly in a wholly satisfactory condition : a great many of the conjectures in emendation that have been executed upon it are more remarkable for their ingenuity than their success. I have abstained from attempting to swell the number. In the translation, which I have made as literal as I could, I have tried to represent fairly the original, but am far from pretending to have succeeded either in accurately translating, or even in clearly comprehending, the entire of this remarkable work.

The first notice of the ‘Lay’ is contained in the *Spectateur du Nord*, 1797, Oct. :—“Mais ce qui vous surprendra peut-être davantage, Monsieur, c’est qu’on a détéré, il y a deux ans, dans nos archives, le fragment d’un poëme, intitulé *le Chant des guerriers d’Igor*, qui peut être mis à côté des plus beaux morceaux d’Ossian, et qui a été fait dans le douzième siècle par un auteur inconnu. Un style énergique, des sentiments d’un héroïsme sublime, des images frappantes puisées dans les horreurs de la nature, font le mérite de ce fragment, où le poëte, traçant le tableau d’un combat sanglant, s’écrie : ‘Ah ! je sens que mon pinceau est faible et languissant ; je n’ai pas le talent du grand Bayan, ce rossignol des temps passés.’ Il y avoit donc en Russie, avant lui, de grands poëtes, dont les ouvrages sont engloutis par les siècles ! Nos annales ne nomment point ce Bayan ; nous ne savons, ni quand il a vécu, ni ce qu’il a chanté. Mais cet hommage, rendu à son génie par un tel poëte, fait vivement regretter la perte de ses ouvrages.”

Whether the enthusiastic writer has fairly estimated ‘le mérite de ce fragment,’ the reader will perhaps be able to judge after its perusal : it is certain that there are

some passages which it would not be easy to parallel for vividness and directness.²

The accidental discovery of a heap of valuable old books and papers had instigated Prince Musin-Pushkin to employ agents in various towns to hunt out and buy up anything savouring of antiquity. One of these agents procured for the Prince the manuscript in which was contained this "Legend of Igor's Raid," from the Archimandrite Joil, a collector of cultivated mind and taste, who, towards the end of his life, had fallen into want, and had been forced to part with all his Russian books. These were bought by the Prince's agent, and in the end of one of them was found the Legend. For several years its new owner kept it by him, and endeavoured to put it into a form that would be intelligible. But as his knowledge of palæography and of the Old Russian language was not of a high order, it is not surprising that there have been considerable gleanings for the succeeding editors. In the MS. there were no stops, the words were not divided, and many of them quite obsolete, he naïvely complains! As to the sigla, the first editors, the Prince and his two collaborators, Malinovski and Bantysh-Kamenski, calmly omitted them sometimes, as Tikhonravov shows (Pref., p. viii.)

The manuscript from which this first edition was made unfortunately perished in the Moscow conflagration of 1812. It was no protograph, however, and could not, indeed, have been of any very great age, as the statements of Malinovski and the researches of Tikhonravov go to show. This MS. may have been written in the sixteenth century.³ It is useless to conjecture what may have

² "Man rühmt mit Recht an diesem Erzeugnisse des Alterthums grosse Kraft des Ausdrucks, Schönheit der malerischen Sprache und kühnen Vergleichen, wie sie der Dichtkunst

jugendlicher Völker eigen ist." F. Wachter, in Ersch und Gruber, art. "Igor's Heerzug."

³ Among the papers of the Empress Catherine II., there was found a copy

been the original form of the work. That it has undergone many changes can hardly admit of doubt, but they most probably did not turn on much that could be sensibly felt in a translation.

Its relations to the old mythological conceptions of early Russia, and the absence of the (Christian) religious element, give some plausibility to the theory that it must have been originally composed at a very early epoch indeed, and by a layman; and as the period of which it treats [1185 A. D.] is alluded to by the writer in terms that make it not improbable that he had been an eye-witness of the incidents, it is not perhaps too credulous to assent to the further theory, that the Lay⁴ was written by one of the *druzhina* (body-guard) of the chief himself, one who had shared in the toils and dangers he so vividly sets forth.⁵

It is not a poem in the narrow sense of the term: there is neither regularly recurrent rime nor rhythm; but it is impossible not to feel that it was the work of a true poet, who sang with that fulness of the heart in which "Glück und Unglück wird Gesang," and with all the sympathies of his soul roused for the land of his love, his father-land, the Russian land.

A brief account of the incidents referred to is here given, by way of introduction:—On 30th July, 1184, Sviatoslav of Kiev had gained a great battle over the Polovtsi on the

of the *Slovo*, made directly from the manuscript edited by Musin-Pushkin; a copy executed under his direction. The collation of this facsimile with the first edition has yielded a certain percentage of correction, but the state of the text still leaves much to be desired.

⁴ "Es wird wol Epos oder Heldensage genannt, ist dieses jedoch nicht im strengen Sinne des Wortes, insofern sein Stoff nicht der Heldensage ange-

hört. Es ist fast eine Mittelgattung zwischen einem rein geschichtlichen und Sage enthaltenden Liede."—Wachter, *op. cit.* To me it is much more *lyric* than *epic*.

⁵ So that Wachter can say—"insofern der Verfasser des Liedes Zeitgenosse der Begebenheiten war, kann manches im Liede mehr geschichtliche Wahrheit haben, als in der Ueberlieferung der Geschichte selbst."

river Orel. On March 1st in the following year, the same fate befel another expedition of the Polovtsi, under their leader Koncak, in spite of his catapults and his Greek fire ["the horn of flame" in Igor, *v.* § viii.]. In this battle, however, Igor had not been present, and thus seems to have been stung into the resolution of his fatal raid of two months after, through the desire of rivalling the exploits of Sviatoslav, and carving out still greater fame for himself and his friends [*v.* § ix.]. He was probably also spurred on by the memory of the great booty he had won from the Polovtsi in his victory of 1173; and as he was now, by the death of his brother Oleg in 1180, ruler of Novgorod-Séverski, and greatly loved by the people, it was not difficult for him to set on foot an expedition against their country's foe. So on the 13th April, 1185, he set out from Novgorod-Séverski, and after being joined by his brother, &c. [*v.* the chronicler's account, p. 121], marched towards the Don. The news of this unexpected inroad soon reached the Polovtsi, who were greatly alarmed, as believing that it was intended to consummate their ruin; and they accordingly assembled in countless multitude to stay the progress of the invader. Their numbers enabled them easily to surround Igor's small band, who, being cut off from retreat, were compelled to fight. In this strait they flung themselves on the vanguard of the Polovtsi, and utterly routed them, returning to their camp with considerable booty, and in the elation and arrogance of their victory they declared that "they had fought right in the heart of the country of the Polovtsi, and thereby had much more honour than Sviatoslav, &c., and so they would go farther on down to the sea, where their ancestors had never penetrated."

In this they were wrong. Nemesis overtook them. The Polovtsi returned in overwhelming crowds, and the hardy Russians were slain or captured to a man on the river Kaiala.

"Tell the people of Kiev," said the Polovtsi, exultingly, to some traders that had been eyewitnesses of the battle, and who were to carry the news of the defeat, "that now we can make an exchange of prisoners." When the news reached Sviatoslav of Kiev, he was bitterly grieved [v. § ix.]; but though he at first assembled the princes with a view to the deliverance of the captive Russians, he soon after dismissed them, as he did not dare to pursue the Polovtsi into their own country, for fear of suffering the same fate as Igor and his companions. This failure to retaliate encouraged the Polovtsi to further incursions and depredations; they came along by the river Sula, capturing many villages, and even laid siege to Pereiaslavl. Here Vladimir Glébovic attacked them like a hero, but was severely wounded with three pike-thrusts, and was with difficulty saved from death or captivity by a gallant sally of the citizens, to whom he was dear. The Polovtsi then turned aside to the town Rim [v. § ix.], which they captured, and returned home to their deserts laden with booty. The manner of Igor's escape is narrated in the chronicle appended.

This unhappy expedition of Igor seems to have encouraged the Polovtsi, who kept up a constant series of invasions for some years after; and in 1201 they took Kiev by assault, and pillaged it frightfully, so that it never again recovered its pristine splendour.

I.

"Were it not well for us, brothers, to begin in old words⁶ the piteous tale of the 'Raid of Igor'—Igor,⁷ the son of Sviatosláv? Then let the song begin, in the fashion of the stories of this present time,⁸ and not after the inventions of Boian.⁹ For the Seer Boian, when he wished to compose a song for anyone, would launch himself forth in thought¹⁰ over the wood, like a grey wolf over the earth,

⁶ In the fashion of the old tales of legendary incident, enlivened with mythical details.

⁷ Several of these names are of Scandinavian origin, and recal the circumstances of the early history of Russia, when her people had to send abroad to seek for a ruler; as the messengers put it, to use the words of the old annalist, "our land is great and fertile, but *order in it there is not*," "zemlja naša velika i obil'na, a narjada v nej nēst."* Thus *Ingvarr* becomes Igor, through the Greek Ἰγγωρ, Ἰγγωρ; *hleifr*, loaf, is *Glbb*; *helgr*, holy, is *Oleg*; *hrurikr*, *hraerekr*, *ruodrich*, is the famous *Rurik* [cf. Nestor, ed. Miklosich, pp. 188, *segg.*]

⁸ On the basis of the historic facts of the time: the writer was probably an eyewitness.

⁹ A personage not known elsewhere, a sort of jongleur or trouvère of the beginning of the twelfth century, who sang the achievements of the princes, to the accompaniment of some musical instrument, like the *banduristi* of later times. Some of his "refrains" are

preserved in the "Lay," according to Afanasiev, vol. i., p. 107.† Buslaev, p. 380,‡ well remarks that "we cannot of course limit the poetic activity of the eleventh to the twelfth century to his sole personality. A singer so famous as Boian could, without doubt, flourish only in a period abounding in poetic creativeness, when the songs of the people were widely sung." Thus probably the name of Boian is here used to denote a whole class of poets, of whom no record is preserved. Our modest poet feels that he has not the poetic afflatus that can alone justify deviations from historic exactitude [*e.g.*, as Goethe justified himself in his *Egmont*]; he will keep himself free from such inventions, the vain imaginings of things that never were. The name Boian is probably the same as 'bajan,' incantator [Miklosich, *Vergleichende Grammatik der Slavischen Sprachen*, II., p. 124, § 45].

¹⁰ If I felt satisfied as to this instr. form, I should prefer Ogonovski's suggestion of reading *slaviju*, 'like a nightingale,' by which we should have the

* *Chronica Nestoris*, ed. Miklosich, cap. xv.

† *Poeticeskaja voznrénija Slavjan na prirodu*, Moskva, 1865.

‡ *Russkaja narodnaja poezija*, S.-Peterburg, 1861.

like the dark-blue¹¹ eagle under the clouds. Told he a tale of the first times of the civil wars,¹² then he would send forth ten falcons on the flock of swans: whichever [falcon] struck, that swan first sang its lay—to old Iaroslav, to the brave Mstislav,¹³ who slew Rededia before his Kasogi¹⁴ troops, or to the handsome Roman,¹⁵ son of Sviatoslav. Aye, brothers, it was not ten falcons on a flock of swans that Boian sent forth, but he swept his prophetic fingers over the living strings, and they themselves resounded with the princes' praise!

"Let us begin then, brothers, this tale from old Vladi-

threefold comparison, the nightingale in the wood, the wolf on the ground, the eagle in the sky. If the text be adhered to, I do not see how to avoid the "old translations," of which Barsov, in his Critical sketch, p. 131, § somewhat sarcastically complains in his critique on Erben's translation. Doctors disagree. Barsov speaks of Erben's (Bohemian) version as not likely to take an honourable place amongst the numerous translators of this unique Old-Russian song: Ogonovski, on the contrary, in an Addendum to his edition, regards it as a fair exposition of the sense of the original.

¹¹ Homer's αἰετὸν περκνόν (μόρφον).

¹² Buslaev, || p. 92, gives *usobitsi* as acc. pl., "recalled he the combatants of the early times."

¹³ Sons of Vladimir the Great.

¹⁴ The Kasogi were Circassians (Cerkessi). Of this incident Nestor gives the following account, cap. 52, ed. Miklosich:—"In the year 6530 (= 1022 A. D.) Mstislav, being at Tmutorokan, went against the Kasogi. Their prince, Rededia, having heard this, went out against him; and while the

two armies stood over against each other, Rededia said to Mstislav:—"Why should we destroy our troops? let us rather fight with each other! and if thou conquerest, then thou shalt take all my possessions, and my wife and my children, and my land; or if I conquer, I will take thine." Mstislav said:—"Be it so." Then Rededia said to Mstislav:—"Let us not fight with weapons, but with wrestling." So they fought, and, after long struggling, Mstislav began to grow faint, for Rededia was big and strong; and Mstislav said:—"O holy mother of God, help me; for if I conquer him, I will build a church in thy name." And having said this, he struck Rededia to the ground, and drew out a knife, and killed him; then he came to his land, and took all his possessions, his wife and his children, and imposed tribute on the Kasogi. And having come back to Tmutorokan, he founded the church, and built it, as it stands there to this day."

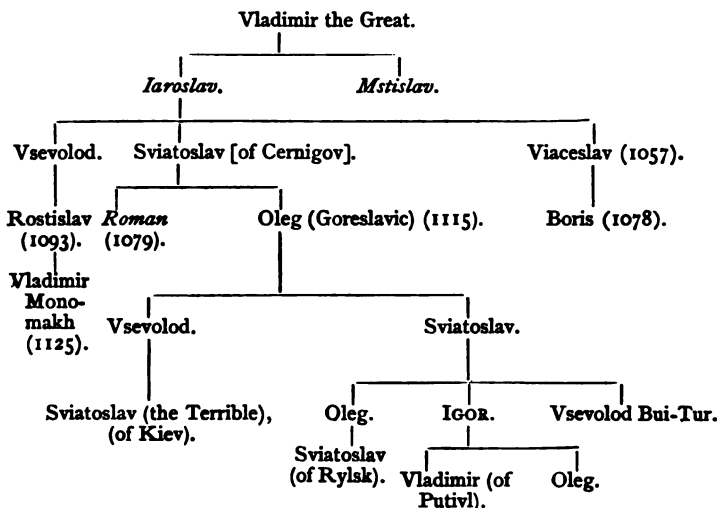
¹⁵ These personages are very puzzling, as the same name is constantly recurring, without any distinctive epithet or number. I have split up the genealogical

† In the *Žurnal Ministerstva narodnago prosvěščenija* of October, 1876.

‡ *Russkaja Khristomatija*, Moskva, 1870.

mir to Igor of our time, who established¹⁶ his soul with his might, and sharpened his heart with his manliness—who, filling himself with a warlike spirit,¹⁷ led his brave sol-

table in Tikhonravov, for convenience of reference :—



¹⁶ Various renderings are proposed for this word *istiagnu*, "extendit"; probably "girded" is best. Prof. Hattala explains it as a metaphor from a strap stretched out, on which he sharpened his heart.

¹⁷ It may not be out of place here to observe that the spirit in which the Cossacks set about their wars is vigorously set forth in their poems; cf. a *virsha* [= "ein volksthümlich gehaltenes Geistesprodukt eines schriftgelehrten Mannes"] in the Ruthenian language, published by Žitecki in the *Archiv für Slavische Philologie*, II., 2, p. 302, and regarded by him as most

probably written by an eyewitness of the battle described, a defeat inflicted by the Poles* on the Cossacks under their chief, Bogdan Khmel'nitski, 1651, and entitled, "A Kozak Duma of the war with the Kozaks at the river Styr."

Khan zgotu radyt, a ne poradyt,
Kozaky vojnu ljubiat :
Oj Kazemyru, juž tobi myru
S kozakami ne budet.

"The khan counsels peace, but does not persuade: the Kozaks love war! O Casimir, there will no peace for thee with the Kozaks." Further on, the writer bursts out, with the loving ap-

* For a brief account of the Cossacks, and their heroic struggles with the Poles, see an article of Emile Durand in the *Revue des Deux Mondes*, 15 Juin, 1876, pp. 923, 999. There is an extended article on the "Polish Colonisation of South-Western Russia," by Kulish, in the *Vistnik Evropy* of March and April, 1876.

diers against the land of the Polovtsi,¹⁸ for the Russian land!

II.

"Then Igor looked up to the bright sun, and saw all his warriors covered over with a mist from it. And Igor said to his body-guard:—'Brothers, and soldiers! better were it to be slain than to be taken prisoners! But let us mount, brothers, on our swift steeds, and go look on the blue Don!' The longing¹⁹ to take the water of the mighty

precipitation of one who had shared in the 'strength of passion rising in the glee of battle':—

Oj u Zborova vojna to nova
Ne jak pid Filjavs'jamy,
Ne utikajut, krov prolyvajut
I na Tatar ne dbajut,
Vo krov i tatars'kij i busurman's'kij
Gostryj mic svoj kupajut.

They don't fly; they bathe their sharp sword in Tatar and Mussulman blood! Or, as the *duma* has it,† treating of this same Bogdan Khmel'nitski:

Ekh kozaki, diti, druzi!
Prošu vas, dobre dbajte,
Na slavnju Ukrainu pribuvajte,
Ljakhiv, mostivikh paniv, u pen' rubajte!
Krov ikh Ljads'ku u poli s žovtim peakom
mešajte!

Come on for our famous Ukraine! smite the Poles, the magnates, to the very root! mingle their Polish blood with the yellow sand!

The savage glee in the fights between Russian and Turk is no new thing. In Rudcenko's collection of the songs of the Cumaks‡ are some scenes which would nearly come up to the horrors of a Special Cor. of the *D. T.*

The vengeful mockery of the Cumaks, when they have (literally) caught a Tatar, whom they hoist aloft on three spears, is hideous enough:—

Divis', divis', busurmane,
Na našu svobodu!
Oj što naša svobodon'ka,
Jak mak, protsvitae;
Busurmans'ka i goloven'ka
Krovju okipae.

Take a good look, you Mussulman, at our freedom! Like a poppy, it flourishes: the Mussulman's head is clotted with blood!

Or in the *duma* just referred to, where the Kozaks have caught some Poles, who beg for their lives; their foes reply grimly:—"Ha, Poles! you Poles! long ago our fathers flung treasures into the river; when you can find them, we will divide them, and will live in amity with you as with brothers. Go! there is your one road — to the very bottom!"

¹⁸ These are not to be confounded with Poles; they were Tatars, who inhabited the territories to the north of the Black Sea.

¹⁹ Reading *pokhoti* (as nom.), though

† *Zapiski o Žukovj Rusi*, ed. Kulish; *S.-Peterburg*, 1856, vol. i., 54.

‡ *Cumatshija Narodnyja Pitsni*, ed. Rudcenko, *Kiev*, 1874.

Don fell on the soul of the prince, while his eagerness hid from him the signs of the sky. 'For,' said he, 'I will break a spear on the borders of the land of the Polovtsi; with you, O Russians, I will either lay down my head, or I will drink in my helm²⁰ of the waters of the Don.' (O Boian, nightingale of olden time! would that thou hadst sung of those soldiers, leaping like a nightingale in the wood of dreamland, flying like an eagle under the clouds, weaving crowns of glory for both sides²¹ of that time, rushing on the path of Troian²² over the fields to the moun-

even thus the sentence is far from clear; but the difficulty is not obviated by the suggestion of "spal um *po khoti*," "he dreamt about his wife."

²⁰ "I will make a victorious raid up to the Don"; cf. Mickiewicz, in his *First Ages of Polish History*, Paris, 1868, vol. iv., p. 330: "wojsko z entuzjazmem *chwytało w szyszałku wodę Baltijku*," 'the army took up into their helms the water of the Baltic.'

²¹ Apparently referring to the time preceding and the time following the civil wars.

²² This *Troian* is a considerable crux. We have the *path* of T., the *age* of T., the *land* of T., mentioned in the Lay, but who he was is not stated. Buslaev, in the *Russkaja Narodnaja Poesija*, p. 385, has a long article on him, to show that he is a relative of the Elves and Dwarfs of the northern mythology, and that Boian, among other mythical features which gave epic colouring to his poetry, had preserved this mention of Troian. It is certain that a Troian is enumerated by the old chroniclers along with the pagan deities, Perun, Khors, and Volos (Veles); v. Afanasiev, *op. cit.*, II., 642, where this legend is told of him:—

"In the town of Troian once lived a king Troian: every night he rode to Srēm to visit his beloved. He rode by night, because he did not dare show himself by day, fearing lest the bright sun should melt him away. On arriving at Srēm, he used to give his horses oats, and when they had finished their corn, and the cocks had begun their crow before dawn, he went off home, to get back to his own town before the rising of the sun. The brother of his mistress found out the matter, and, having seized all the cocks of the place, cut out their tongues, and substituted sand for the horses' oats." So neither the horses neighed, nor the cocks crowed, and poor Troian was caught; for, though he did get away before dawn, he was not in time, and in fear of the sun he hid himself in a hay-stack; but some cows got at the stack, and pulled away the hay, so that the rays of the sun melted the unlucky king.

Probably, however, it is merely a reminiscence of the name of the Roman Emperor, and perhaps Ogonovski is right in interpreting this *road of Troian* as "the great highway," "the beaten path."

tains! *Thou* shouldst have sung the song to Igor, the descendant of that [famous Oleg]:—"it was not a storm whirled the falcons across the broad fields: flocks of jackdaws²³ are flying over to the mighty Don!" Or how should it have been sung, O prophetic Boian, grandson of Veles²⁴ ?)

The steeds neigh at the Sula, the praise [of Sviatoslav] resounds in Kiev, trumpets blare in Novgorod,²⁵ standards wave in Putivl! Igor awaits his dear brother Vsevolod! Then spake to him Bui-Tur²⁶ Vsevolod:—"Thou art my only brother, my one bright light. O Igor, we two are the sons of Sviatoslav. Saddle now, brother, thy swift steeds; mine are ready, saddled beforehand at Kursk. And these my men of Kursk are well-known soldiers, swaddled under trumpets, cradled under helms, fed with the point of the spear; the roads are known to them, the ravines are familiar,—their bows are bent, their quivers are open, their sabres sharpened; they themselves are leaping like grey wolves over the plain, seeking for themselves honour, and for their prince renown!"

²³ It is not the Russian falcons that are flying to the Don, but the troops of the Polovtsi. The jackdaw, in the popular symbolism, is an ill-boding bird, like the crow.

²⁴ According to Afanasiev, this Veles is identical with the god of the heavenly herd, the thundering clouds of the sky; but, just as Apollo [cf. Preller, *Gr. Myth.*,³ I., p. 215, note, where are quoted many epithets of Apollo] was a shepherd, but also the god of music, so to Veles this patronage of music was attributed; hence the singer Boian is termed the descendant of Veles, the son of Apollo. The similarity of this name Veles with the Christian Vlasi (Blasius) has given rise to various con-

jectures, which Krek (in the *Archiv für Slav. Philologie*, I., i., pp. 134, *seqq.*) has shown to be untenable: "der heidnische Gott war die directe Ursache, dass das Volk mit der Legende des heiligen Blasius vertraut gemacht wurde." In the legend, St. Blasius was represented as the patron of cattle: so the saint superseded the old pagan Veles, who was specially termed the protector of the herds.

²⁵ Sêverski Novgorod (in the government of Cernigov).

²⁶ Bui-Tur, 'mighty wild-bull' (urus). There were wild bulls in Europe down to a comparatively late period (17th Cy.) In the old Bohemian songs of the Kralodvorsky Rukopis, Zdeslav boasts

III.

Then Igor placed foot in his golden stirrup, and rode over the open plain. The sun overspread his road with darkness;²⁷ night moaning over against him with its menace awoke the birds; the wild beasts' scream uprose,²⁸ and the Div's²⁹ wild shriek is heard above the wood, as she bids the unknown land take heed,³⁰ the Volga, the banks of the [Black] sea and of the Sula, and Surozh,³¹ and Korsun,³² and thee, idol of Tmutorokan!³³ But the Po-

how his ancestor had slain wild bulls, 'pradied mói zbi *diva tura*,' Vsevolod Bui-Tur was prince of Kursk.

²⁷ The eclipse of 1185 (Afanasiev, I., 751).

²⁸ Reading with Ogonovski *vūstalū*. The text has been variously tortured. Musin-Pushkin has *vū stasbi*; O. gives half-a-dozen conjectures, of which the most ingenious is perhaps that of Hattala, *stasū bi*, "struck the road," but?

²⁹ This *Div* is mentioned by the Chroniclers as a god worshipped along with Perun and Khors [Afanasiev, I., 128; II., 617]; originally a bright god, afterwards degraded into a name for unclean spirits. In the Ukraine there is still heard the curse, 'shtob na tebe *div* prishov,' may the *div* come at thee!

³⁰ *I. e.*, tells the Polovtsi of the approach of the Russians. For this ill-boding shriek, cf. Schleicher's "Litauisches Lesebuch," p. 8:—"Laima szaukė, Laima verkė, basl bėgau pėr kalnėlį," "the Laima shrieked, the Laima wept, as she ran barefooted over the mountain."

³¹ Sea of Azov.

³² Kherson, the ruins of which are

found near Sevastopol.

³³ Town on the peninsula of Taman, and holding an important position as the key of the Sea of Azov. It originally belonged to the Khazars, but was taken from them at an early period by old Sviatoslav, of Kiev. Before 1078, it was held by Roman, and after his death by his brother, Oleg, the grandfather of our Igor. In 1111, the Polovtsi seized it, and held it. But it did not cease to be an object of desire to the Russian princes, who have always, and naturally, shown a remarkable tenacity of purpose in striving after the possession of keys. But what was the 'idol of Tmutorokan'? Perhaps, says Ogonovski, a monument which Komozarija, wife of Perisad, prince of the Bosphorus, built, in consequence of a vow, to the great gods Sanerg and Astarte. The pedestal of the statue, with a suitable inscription, was found in 1805, on the shore of the Bay of Akhtaniszovski, but the statue itself had totally disappeared. Thus this idol represented two chief deities, who protected the Asiatic passes, and were hostile to the Russians.

lovtsi by untrodden⁴ ways ran up to the mighty Don ; their telegas⁵ creak at midnight, as the swans [scream] when rushing out in flight. Igor leads his warriors to the Don ; but already the bird watches for his misfortunes for havoc ;⁶ the wolves with menace howl down the ravines ; the eagles, with their scream, call the wild beasts to the bones ; the foxes yelp over the blood-red shields ! O Russian land [adieu !], thou art left far behind ! Long glimmers the night, the twilight has faded away, a mist has covered the fields, the note of the nightingale is stilled, the chatter of the magpie is now awake. The Russians have barred the wide fields with their blood-red shields, seeking for themselves honour, and for their prince renown !

IV.

On Friday's dawn they trod down the miscreant Polovtsi, and spreading like arrows over the plain, they dragged off the fair Polovtsi maidens, and with them their gold, and silks, and costly satins. With bags (?), and cloaks, and furs, and with all the treasures of the Polovtsi, they began to build bridges over the marshes and boggy places, and all the morasses of the Polovtsi. Red is the standard, the banner white, red the pennon (?), silver the lance, of the brave son of Sviatoslav ! On the field dreams the fair nest [children] of Olga ; it has flown a long dis-

⁴ On the pathless steppe.

⁵ The present carts (telegas) can creak. The Russians, indeed, have a proverb purporting that a cart that does not creak is a dishonest one.

⁶ Ogonovski has here adopted a desperate conjecture of Maximovic, in which I cannot follow him ; for the *podobiju* of the Edd. he reads *po losiju*, 'on the willow,' as a parallel to 'in the ravines.' I would suggest *po do-*

biju, 'for havoc : ' *po* with the dative may denote the motive of an action, cf. Miklosich, *Vergleichende Syntax der Slavischen Sprachen*, p. 629, f.; though I do not find any *dobij* in his list of nouns with suffix-*ŭ*, *Vergl. Stammbildungslehre* (I., 1. 1). But Dal', in his Dictionary, sub voce *dobivat'*, 'to give the coup de grace,' gives *doboj* as the nomen actionis.

tance! It was not born for injury, neither by the falcon, nor by the vulture, nor by thee, black raven, miscreant Polovcin! Gza flies like a grey wolf; Koncak³⁷ follows his track to the mighty Don!

V.

Next day at early morn a bloody dawn lights up the world! black clouds come up from the sea, that would fain cover over these four suns,³⁸ and in them flash the blue lightnings. The thunder is lumbering up; the rain will rush down like arrows³⁹ from the mighty Don. Then spears will be broken, and sabres hacked on the helms of the Polovtsi, on the river Kaiala, near the mighty Don. O Russian land, already thou art left far behind! Lo, the winds, the grandchildren of Stribog,⁴⁰ blow from the sea like arrows against the brave troops of Igor. Earth groans, the rivers flow all troubled, dust covers the fields, the banners roar. The Polovtsi come from the Don, and from the sea, and from all sides; they surround the Russian forces. Those devil's children, with their cry, barred all the fields, but the brave Russians fenced themselves in with their blood-red shields. O Iar-Tur⁴¹ Vsevolod! thou standest in the forefront of the battle, thou besprinklest the foe with thy arrows, thy swords of steel gride through the foe-men's helms. Wherever Tur leaped forth, flashing with his golden helm, there lie the accursed heads of the Polovtsi, the Avar⁴² helms hacked with the tempered sabres,

³⁷ Gza and Koncak, names of the two Khans of the Polovtsi.

³⁸ Viz., Igor; his brother, Vsevolod; his son, Vladimir; and his nephew, Sviatoslav (of Rylsk); *v.* p. 121.

³⁹ Afanasiev (*l.*, 490) calls attention to this comparison of the noisily falling rain to 'arrows;' the reverse applica-

tion is common enough of arrows falling like rain (hail).

⁴⁰ Stribog is the god of the winds: Afanasiev, *l.*, 91, 320.

⁴¹ *I.e.*, fierce wild bull.

⁴² There is still an Avar tribe in the Caucasus, between Georgia and Circassia.

by thee, Iar-Tur Vsevolod! What wound is dear,⁴³ brothers, when he has forgotten his (princely) honour,⁴⁴ his life, and the town of Cernigov, his father's golden throne, and his dear love, the beautiful Glébovna—aye, all manners and customs?⁴⁵

VI.

The age of Troian⁴⁶ is gone; the years of Iaroslav have passed away; gone are the troops of Oleg, of Oleg, son of Sviatoslav. For it was Oleg that with his sword forged strife,⁴⁷ and sowed his arrows over the earth. He mounts into the golden stirrup at the city Tmutorokan. Then the great Vsevolod, son of Iaroslav, heard the old sound (of war), but Vladimir every morning stopped his ears⁴⁸

⁴³ Held too costly (?) ; reading (O.'s) *rana*, for *rany*. Hattala keeps the text, but renders *doroga*, 'way,' 'the way of wounds.'

⁴⁴ Fighting in the ranks as a common soldier, as Ogonovski interprets.

⁴⁵ *I. e.*, 'forms and ceremonies.'

⁴⁶ The good old times.

⁴⁷ Here the writer recalls how Igor's ancestor had brought in these enemies on the Russian land. On the death of Sviatoslav, the grand duke Iziaslav and Vsevolod ousted Oleg from the duchy given him in appanage by his father Sviatoslav. In the war that ensued, fortune varied, till at last, in a decisive battle of Oleg and his cousin Boris (son of Viaceslav, the brother of Sviatoslav), against the four princes, Iziaslav, and his son Iaropolk; Vsevolod, and his son Vladimir Monomakh; Boris and Iziaslav were slain, and Oleg was totally defeated, and compelled to flee to his brother Roman, to Tmutorokan. There he stayed for some time, marrying his son to a princess of the Polovtsi Tatars, with whom he entered into alliance.

In 1079, Roman, with the Polovtsi, took the field against Vsevolod, who found means, however, to detach the Polovtsi from their allies, in consequence of which they returned home, and killed Roman.

⁴⁸ Barsov (in the *Žurnal*, p. 111) has pointed out many parallel usages in Greek writings to the phrases found in the old Slavonic chroniclers. Among them he notes this 'stopping of the ears' in order not to be affrighted with the shouts of the foe as they attacked, quoting Fl. Josephus, lib. 11., c. vii., 25: *ἐκέλευσε δὲ πρὸς μὲν τὸν ἀλαλαγμὸν τῶν ταγμάτων ἐπιφράσαι τὰς ἀκοὰς ὥς ἂν μὴ καταπλαγεῖεν*. This din of battle caused Vladimir to stop his ears, *i. e.*, troubled him, but at the same time inflamed him to manliness (*razžigal ego k mužestvu*). But Ogonovski interprets: 'this famous prince [Vladimir] loved peace, and therefore stopped his ears, that he might not hear the noise.' So Buslaev, 'preferring peace and harmony, Vladimir remained deaf to the noise.'

in Cernigov. And now Fame brought to his fate Boris, son of Viaceslav, and spread a shroud over the green steppe-grass,⁴⁹ for the injury done to Oleg,⁵⁰ the brave young prince. [From that Kaiala, Sviatopolk⁵¹ ordered his father to be taken up amid the Hungarian horses and carried off to St. Sophia in Kiev.] Then in the time of Oleg Gorislavic,⁵² was a sowing and growing of civil wars, the happy time of the children of Dazhd-bog⁵³ was ruined, and the lives of men were shortened by the intrigues of the princes. Then over the Russian land rarely sang ploughmen, but often the ravens croaked, as they divided among themselves the corpses, while the jackdaws said their say, as they strove to fly on their food.⁵⁴ Such was the state during these battles and expeditions, but the like of that war was never heard of.

VII.

From early morning till evening, from evening till the dawn, fly the tempered arrows, the sabres thunder on the helmets, the spears of steel rattle, on that unknown plain, amid the land of the Polovtsi. The black earth beneath the hoofs was sown with bones and watered with blood :

⁴⁹ This is a conjecture of Ogonovski (*kovylu* for the traditional *kaninu*). It is not a convincing emendation, but it is, perhaps, not more unintelligible than either Hattala's *thaninu*, or Dubenski's *koninu*, or the geographical *kanina*.

⁵⁰ By his uncles Iziaslav and Vsevolod, in depriving him of his appanage. By the brave young prince, Buslaev, however, understands Boris, son of Viaceslav.

⁵¹ This passage is bracketed by Ogonovski as a later gloss, for Sviatopolk was not in the battle at all. He might, however, have given directions to his brother

Iaropolk to do as said in the text.

⁵² So named because he brought such woe (*gore*) on Russia.

⁵³ The old pagan name of the god of the sun; in the early translations of Greek chroniclers, while the heathen beliefs were still fresh and lively amongst the Slavonians, *ἥλιος* is rendered *Dazhdog*, Afanasiev, I., 65, note 1; the *sky* (*svarog*) has two children, the *sun* and *fire* (*ibid.*, I., 193). By the children of Dazhd-bog are meant, no doubt, the Russians.

⁵⁴ The corpses left on the field of battle.

there grew up as fruit of that sowing, misfortunes for the Russian land. What do I hear, what sound rings in my ear in the morning before the dawn? It is Igor turning back his troops, for sadness was on him for his dear brother Vsevolod. They fought a day, they fought a second day, on the third day about midday the standards of Igor fell. There the two brothers separated⁵⁵ on the bank of the swift Kaiala. There failed the supply of bloody wine; there the brave Russians finished the banquet: they made drunk their gossips,⁵⁶ and themselves laid down their lives for the Russian land. The grass bends down to earth for very grief, and the tree inclines to earth for the pity of it.

VIII.

For now, brothers, the joyless time has come; now emptiness has hidden our might. Bale⁵⁷ has loomed large upon the might of the children of Dazhd-bog; it has come like a Div on the land of Trojan;⁵⁸ it has flapped with its swan-like wings over the blue sea; flapping with its wings about the Don, it has waked up the evil times. The expedition of the princes against the pagans had come to nought; then spake brother to brother, "this is mine;"⁵⁹ aye, and that is mine," and the princes began to say of a little thing, "this is a great thing," and forged intrigues against each other; while the pagans from all sides rushed on with victories over the Russian land.

O! far flew the falcon,⁶⁰ driving the birds to the sea, but there is no bringing to life for the soldiers of brave Igor! Behind him screams Koncak, while Gza gallops

⁵⁵ They were both taken captive by the Polovtsi.

⁵⁶ The fight is compared to a banquet in which the Russians gave abundance of wine (their blood) to their gossips (their foes).

⁵⁷ Bale, as a fiend, has appeared

among the Russian troops.

⁵⁸ The Russian land.

⁵⁹ A technical phrase of old Russian law, used in asserting a claim to disputed property.

⁶⁰ *I. e.*, Igor pursued the Polovtsi down to the sea of Azov.

over the Russian land, flinging down fire from the flaming horn. The Russian wives wept, saying, "our dear husbands no more may we think of in thought, nor dream of in idea, nor see with our eyes; and of gold and silver, not even a little shall we handle." Aye, and Kiev groaned at the calamity, and Cernigov at the misfortunes: grief spread over the Russian land, heavy trouble overflowed the Russian land. But the princes forged intrigues against each other, while the pagans, making victorious incursions into the Russian land, took tribute of a squirrel⁶¹ from every house. For those two brave sons of Sviatoslav, Igor and Vsevolod, again awakened the lie, which their father⁶² had put to sleep, Sviatoslav⁶³ the Terrible, prince of Kiev. He was a thunderbolt, he spread terror with his powerful armies and swords of steel; marching against the land of the Polovtsi, he overran hill and dale, muddied⁶⁴ the rivers and lakes, dried up stream and marsh; he tore out the pagan Kobiak from the sea of Azov like a whirlwind from his mighty iron host; and Kobiak died in the city of Kiev, in the palace of Sviatoslav. The Germans and Venetians,⁶⁵ the Greeks and Moravians, sang praise to Sviatoslav; they blame prince Igor, who flung our wealth to the bottom of the Kaiala, the river of the Polovtsi; there they buried beneath the water the Russian gold. There prince Igor came down from the golden saddle, and stepped into the saddle of a captive.

⁶¹ So Ogonovski; Buslaev renders silver coin' of some fixed amount.

⁶² He was only their cousin; it is a *licentia poetica* to call him 'father.'

⁶³ The poet here recalls the victory gained by Sviatoslav over the Polovtsi a few months before, when 7000 of them were taken captive, with many of

their chiefs, among them Kobiak, so that the victors returned home 'with fame and great honour.'

⁶⁴ By transporting his troops over them.

⁶⁵ Foreign merchants residing in Kiev.

IX.

The ramparts of the towns were sad, and gladness disappeared. But Sviatoslav beheld a troubled dream:—"In Kiev-on-the-mountains last night," he said, "you drest me in a black shroud on a bed of yew; they poured out for me blue wine mingled with sorrow; they covered me over with empty quivers of the prowling pagan, a great pearl on my bosom, and so caress me! [?] Already the planks were without crossbeams⁶⁶ in my gold-roofed tower; all night from eventide the ravens of the devil⁶⁷ croaked; at Plésnisko on the suburb were the woody ravines of Kisan, and I will not send to the blue sea." [?] And his boyars [nobles] said to the prince:—"Already, prince, sorrow has taken captive thy mind. For the two falcons flew from their father's golden throne, to visit the city of Tmutorokan, or to drink the waters of the Don in their helm. And now with the sabres of the pagan folk they have cut off the wings of the two falcons and cast them into iron chains. But it was dark on the third day: for the two suns⁶⁸ grew dim, the two crimson pillars perished, and with them the two young moons, Oleg and Sviatoslav,⁶⁹ were overspread with darkness. On the river Kaiala, darkness hid the light; over the

⁶⁶ *I. e.*, Probably, ready to fall in and crush their occupants.

⁶⁷ The passage is almost certainly corrupt. But I cannot adopt Ogonovski's conjectures and interpretation; *bésorny*, in place of *bosorny*, is plausible,—at least, Hanka's (and Hattala's) *busorny* '(ravens) of Bus' seems the only alternative [for *Bus* v. note 71]; but the rest of the sentence I have vainly endeavoured to understand. Ogonovski reads *debri* for *debr'* (and then has to supply *de* 'where'), besides altering *sošljiu* into *sošli*, and interprets

the sentence thus:—'the ill-boding ravens, *i. e.*, the Polovtsi, would not fly away to the blue sea, to their steppes, but sat down at Plésnisko'. He supposes this Plésnisko to have been seized by a certain Kisan, one of the Polovtsi leaders, as a basis of operation in his attacks on the Russian towns and villages. I cannot think this correct; it is too concrete to harmonise with the symbolism of the rest of the dream.

⁶⁸ Igor and Vsevolod.

⁶⁹ The son and the nephew of Igor.

Russian land the Polovtsi have spread themselves like a brood of panthers; they have sunk (our glory) in the sea, and have added great daring to the Khan. Already the blame has overcome the praise, already calamity has broken our freedom, already the Div has flung herself on the land. For lo, the beautiful Gothic maidens⁷⁰ have sung their songs on the bank of the blue sea; sounding with Russian gold, they sing of the time of Bus';⁷¹ with caressing words they stir them up to vengeance for Sharokan! And we now, thy bodyguard, long for the times of mirth."

Then the great Sviatoslav let fall a golden word mingled with tears, and said:—"O my sons, Igor and Vsevolod! too early ye rose to smite with your swords the land of the Polovtsi and to win fame for yourselves. But ye have fought without fame, for ye have shed without honour the blood of the Polovtsi. Your brave hearts were forged in cruel steel, and tempered in hardihood. And this is what ye have done to my silver hairs! Now no longer do I behold the power of the mighty and rich, the numerous forces of my brother Iaroslav, with the Cernigov troops, with the Moguti and Tatrani, and Shelbiri and Topcaki, and Revugi and Olberi. For these, without shields, with knives pursue with cries the troops, shouting in praise of their ancestors."⁷² But ye said:—"Let us ennoble ourselves! let us ourselves now lay hold of the fame that should come

⁷⁰ There had been Goths [Ostgothen] on the borders of the Black Sea and the Sea of Azov from the latter half of the second century, and remnants of them were found even down to the sixteenth century. Their maidens probably got the Russian gold from the hands of the victorious Polovtsi.

⁷¹ The East Goths, towards the end of the fourth century, had a king Vinitar, who made a war on a Slavonian

king, Booz (Bus), whom he took prisoner and crucified. The Gothic maidens, therefore, recal this glorious time of the victory of Vinitar, in honour of the success of the Polovtsi, gained also over a Slavonian people.

⁷² "These were successful, they had been content to magnify the glory of others; while ye, through your eagerness to snatch at the praise which can only come with time, have failed."

hereafter, and let us ourselves share it along with the past!' And is it a wonder, brothers, for an old man to grow young?" When the falcon is moulting, he still soars high after the birds; he does not give up his nest to ruin. But this evil of the princes is a great loss to me; the hours of happiness have turned to nought. Lo! in Rim⁷⁴ there is groaning beneath the sabres of the Polovtsi, but Volodimir⁷⁵ [groans] under wounds; grief and woe⁷⁶ for the son of Gléb!

X.

"O great Prince Vsevolod!" shouldst not thou fly hither from afar like thought to protect thy father's golden throne? For thou canst splash through the Volga with thy oars, and empty the Don with thy helms! Wert thou here, there would be captives for a groat⁷⁷ and slaves for a penny; for thou canst shoot even over the dry land with living guns⁷⁸ together with the brave sons of Gléb.

"O mighty Rurik and David!"⁷⁹ did not ye swim in blood up to your golden helms? Do not your brave soldiers in that unknown land roar like wild bulls when wounded with the tempered sabres? Mount, lords, into the golden stirrups

⁷⁴ "But, old though I am, I will not give them up without an attempt at rescue; for them I will renew my strength, like the falcon that has moulted."

⁷⁵ The town Romen, of old Rim, in Pultava.

⁷⁶ In the Chronicle of Kiev we read that after this victory on the Kaiala the Polovtsi pushed on as far as Pereiaslavl, to which they laid siege, and wounded its prince, Vladimir, son of Gléb. But when they learnt that Sviatoslav was marching against them, they turned off to Rim (a town belonging to Vladimir), which they took and

destroyed before help could be brought.

⁷⁷ Seeing that he was the only prince who could inflict vengeance on the Polovtsi for the injury done to Russia.

⁷⁸ Vsevolod the Great was brother of the Gléb just spoken of, the two being sons of Iuri Dolgoruki, son of Vladimir Monomakh.

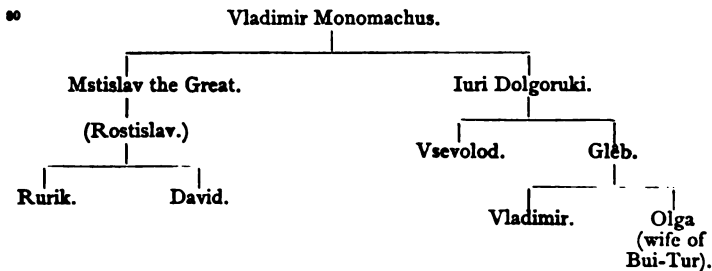
⁷⁹ The coins mentioned, *nogata* and *rehan*, were equal to ½th and ½th of a *grivna*, respectively. The value of a *grivna* now is only 10 copecks.

⁸⁰ Probably the same as the 'horn of flame' in § viii., or perhaps gunpowder is meant.

for the injury of this time, for the Russian land, for the wounds of Igor, the heroic son of Sviatoslav !

"Thou, Osmomysl Iaroslav⁸¹ of Galicia, high thou sittest on thy gold-beaten throne, holding up the Hungarian mountains⁸² by thy iron troops, barring up the road against the [Hungarian] king, closing the gates of the Danube, hurling huge stones⁸³ over the clouds, giving judgment up to the Danube. Thy terrors flow over the lands; thou openest the gates⁸⁴ of Kiev, and from thy father's golden throne shootest thy arrows against the Sultans in far distant lands. Shoot then Koncak, the pagan captive ! for the Russian land, for the wounds of Igor, the heroic son of Sviatoslav.

"Thou, too, heroic Roman,⁸⁵ and thou, Mstislav, your brave thoughts hurry your souls to deeds. Thou soarest aloft to action in thy heroism, like the falcon hovering in the air when he would seize the bird in his mighty swoop. For beneath your Latin⁸⁶ helms you have iron



⁸¹ Igor's father-in-law, for his wit and eloquence called *osmomysl*, "eight-witted." Wachter compares the 'zwölf-mansstärke' of the German Helden-sage.

⁸² The Carpathians.

⁸³ From catapults, &c.

⁸⁴ Thou art able to enter Kiev when thou choosetest; or, thou permittest others to enter, or perhaps, thou rulest over, Kiev.

⁸⁵ This Roman was one of the most famous princes of his time. He was an object of such terror to the Polovtsi that, according to the Chronicles, they terrified their children with his name. He was the son of a cousin of Rurik and David. Mstislav was Rurik's cousin.

⁸⁶ People of the Latin faith (not the orthodox Greek Church)—the Germans.

wings, with which the earth trembles, and many a country of the Khan; Lithuania, the Iatvagi, Deremela and the Polovtsi flung away their spears, and laid down their heads under those swords of steel. But now, O Prince, the light of the sun has gone down for Igor, and for no good has the wood let fall its foliage. On the Rosa, and on the Sula, these Polovtsi have shared among themselves the towns; and the brave army of Igor cannot be recalled to life. The Don calls to thee, O Prince; it summons the princes to victory. The brave princes, the sons of Oleg, have come in time for the battle.

"O Ingvar and Vsevolod, and all the three sons of Mstislav, six-winged" birds of no ill nest! ye seized powers for yourselves, not by the lot of victories.⁸⁸ To what end are your golden helmets, your Polish spears and shields? Bar up the gates of the land with your sharp arrows, for the Russian land, for the wounds of Igor, the heroic son of Sviatoslav."

XI.

For no longer the Sula flows with silver streams to the city of Pereiaslavl; the Dvina flows like a marsh⁸⁹ by those terrible Polovtsi under the shout of the pagans. Iziaslav alone, the son of Vasilko, rang with his sharp swords against the Lithuanian helmets, surpassing the fame of his ancestor Vseslav, but was himself smitten down by the Lithuanian swords under the red shields on the bloody grass. But he seized that [fame] on his bed[?], and said:—"O prince," the birds with their wings have clothed thy soldiers, and the wild beasts licked their blood." The

⁸⁸ Probably alludes to the six-winged birds of mythic story.

⁸⁹ Ruled by way of lawful inheritance, not by right of conquest.

⁹⁰ The rivers ran with troubled

streams in sorrow for the fall of Igor.

⁹⁰ As this must be addressed to Iziaslav, it seems probable that there is some omission.

brother of Briacislav was not there, nor the other Vsevolod; alone he let out his pearly soul from his brave body through the golden necklace. The voices echoed sadly, all sound of joy was stilled, only the trumpets of Gorodno⁹¹ blare.⁹²

O Iaroslav and all descendants of Vseslav! now you may lower your banners, now sheathe your blunted swords, for now you have fallen away from the fame of your ancestors. For you, with your intrigues, began the bringing in of the pagans into the Russian land, against the life of Vseslav. By your strife captivity has come on us from the land of the Polovtsi.

In the seventh age of Troian,⁹³ Vseslav cast the lot for the maiden dear to himself.⁹⁴ He fixed himself on⁹⁵ his horse and galloped to the city of Kiev, where he won the golden throne with his lance. From thence, like a wild beast at midnight, he leaped forth from Belgrad, and hung himself in the blue mist; in the morning early he thundered with his battering-rams, and opened the gates of Novgorod; so he broke the fame of Iaroslav, and leaped like a wolf⁹⁶ to the Nemiga from Dudutki.

On the Nemiga, they spread out the heads in sheaves; they thresh with flails of steel; on the threshing-floor they lay the carcasses; they winnow the soul from the body. Evil was the sowing on the bloody banks of the Nemiga: they were sown with the bones of Russia's sons!

Prince Vseslav judged the people, and appointed to the princes their ranks; he himself in the night ran about

⁹¹ A town belonging to Iziaslav, near which he fell.

⁹² At his funeral.

⁹³ I do not know what this means. Ogonovski suggests that the number "seven" is merely a typical number, denoting the seventh and last period of the happy times.

⁹⁴ The maiden here probably denotes

the city of Kiev.

⁹⁵ Literally, "with hooks." Tikhonravov renders "with cunning, deceit of witchcraft": perhaps Viazemski's ("with the bend of the knee," *i.e.*) "firmly," is what the poet meant.

⁹⁶ Alluding to his transformation as a *werewolf*.

like a wolf; from Kiev he galloped before cock-crow"⁹⁷ to Tmutorokan, like a wolf he got before⁹⁸ the mighty Khors⁹⁹ in his road. For him in Polotsk they rang the bells early for matins in St. Sophia; but he heard the sound in Kiev.¹⁰⁰ Though a prophetic soul in a friendly body, still he often suffered misfortunes. To him the seer Boian for the first time sang with clear judgment this refrain:—"Neither the cunning, nor the swift, not even the swift bird, can escape the judgments of God!"

O! well may the Russian land groan, remembering the happy times of old, and the first princes! That old Vladimir it was not possible to chain down to the mountains¹⁰¹ of Kiev; and now, his standards have become partly Rurik's, partly David's; but being separate they but flap their tails;¹⁰² it is only on the Danube that they celebrate the (Russian) spears.¹⁰³

XII.

The voice of Iaroslavna¹⁰⁴ is heard; like a cuckoo¹⁰⁵ at early dawn she complains:—"I will fly," she says, "like a

⁹⁷ Vseslav, being born of magic, and himself a magician, had to achieve his wondrous exploits before cock-crow, according to the popular superstition.

⁹⁸ He ran with such speed as to outstrip the sun in his course.

⁹⁹ Khors is the sun-god.

¹⁰⁰ Only possible to him as a magician.

¹⁰¹ To keep him alive among men.

¹⁰² Are flapping idly in the wind: David gave no sign, and brought no help.

¹⁰³ A difficult clause, referred by Tikhonravov to the succeeding paragraph. I have followed Ogonovski, but very doubtfully.

¹⁰⁴ Igor's wife, Evphrosine, daughter of Iaroslav (note 81).

¹⁰⁵ The cuckoo is the symbol of sorrow for an absent or lost love. ["A sister bewailed the death of her brother* till she was turned into a cuckoo. Since then the cuckoo became the death-bird of the Servians." Gusle; Serbische Nationallieder, von L. A. Frankl; Wien, 1852.]

* (Among the Servians) "das geschwisterliche Verhältniss ist besonders innig und ausgebildet. Die Schwester schwört den heiligsten Eid bei ihrem Bruder; beim Haupte des Gatten zu schwören verbietet die Schamhaftigkeit. 'Sie ist schwurlos', bedeutet, 'sie hat keinen Bruder': sie und die Mutter, nicht die Gattin, beklagen den Todten." v. Gusle, Pref., p. xiii.

cuckoo to the Danube;¹⁰⁶ I will dip my beaver armlet in the river Kaiala; I will wipe my prince's bloody wounds on his worn body."

Iaroslavna at early dawn weeps on the ramparts at Putivl, saying:—"O wind, little wind! why, my lord, blowest thou so violently? Why with thy light wings flingest thou the arrows of the Khans on my husband's soldiers? Was it a small thing for thee to be blowing aloft in the clouds, while cradling the ships in the blue sea? Why, my lord, hast thou dispersed my joys over the grass of the steppe?"

Iaroslavna at early dawn weeps on the ramparts of Putivl, saying:—"O Dniepr, of old fame! thou hast traversed the rocky hills through the land of the Polovtsi; thou hast cradled on thy bosom the boats of Sviatoslav,¹⁰⁷ bearing them down to the troops of Kobiak; waft to me my husband, that I may not have to send to him my tears across the sea at early dawn!"

Iaroslavna at dawn weeps on the ramparts of Putivl, saying:—"O bright and thrice bright sun! thou art warm and beautiful to all; why, my lord, hast thou spread thy sorrowful ray on my husband's warriors? on the dry land, where no water is, thou hast strung their bows with thirst, and fastened up their quivers with distress!"

XIII.

The sea is dashing at midnight; waterspouts rise up in mists. To Prince Igor God shows a road from the land

¹⁰⁶ "It has long been noted as a significant fact that in the popular poetry of the Slavs, the Danube lords it over all other rivers, to such an extent, indeed, that it seems even used to express 'river' in general." "All the other rivers of the Ukraine, the Dniepr, Dniester, Don, Desna, &c., are put

quite in the background." *V.* the article of Jagié (in the Archiv, 1. 2, 299), where "dieser allen Slaven so sehr sympathische Fluss" is described as forming "gleichsam den Stützpunkt des ganzen menschlichen Thuns und Treibens," and as especially playing an important role "in allen Herzensangele-

of the Polovtsi to the Russian land, to his father's golden throne. The evening twilight fades. Igor sleeps; Igor watches; Igor in thought measures the fields from the mighty Don to the little Donets. A horse at midnight neighs.¹⁰⁸ Ovlur¹⁰⁹ whistles beyond the river. He bids the prince be on his guard. So Prince Igor vanished; earth creaked and clashed; the grass murmured; the tents of the Polovtsi bestirred themselves.¹¹⁰ But Prince Igor leapt like an ermine to the reeds, like a white waterfowl into the water, flung himself upon the swift steed, and galloped off on it like a grey wolf; he reached the meadow of the Donets, and flew like a falcon under the mists, killing geese and swans for morning, midday, and evening meals. While Igor flew like a falcon, Ovlur rushed on like the wolf, shaking off from himself the cold dew; for now both had exhausted their swift steeds.

The Donets said:—"O Prince Igor! not small is thy renown, and the chagrin of Koncak, and the joy of the Russian land."

Igor said:—"O Donets! not small is thy renown, who hast cradled a prince on thy waves, and hast spread for him the green grass on thy silvery banks, and hast covered him with warm mists under the green wood; thou hast protected him by the wild goose on the water, by the mews on the streams, by the ducks on the winds." Not so, said he, was the river Stugna:¹¹¹ though it has but a poor stream, it swallowed up other streamlets, and spread its waters to the bushes[?]. To the young Prince Rostislav the Dniepr closed its warm banks. The mother of Rostislav

gezeiten." Hence its significance escape.

here.

¹⁰⁸ The *Lavor* of the Chronicle, p. 124.

¹⁰⁹ Referring to the sympathy shown by the river to Sviatoslav in his expedition against Kobiak.

¹¹⁰ As the Polovtsi make haste to pursue the fugitive.

¹¹¹ *I. e.*, is ready for Igor's attempted

¹¹¹ Alluding to the death of young Prince Rostislav in the Stugna, in 1093.

weeps for the young prince. The flowers faded through grief, and the tree with sorrow bent down to the ground.

It was not magpies that chattered. It is Gza as he gallops with Koncak in pursuit of Igor. Then the ravens croaked not; the jackdaws were silent; the magpies chattered not; they only hopped about the willows; the woodpeckers with their peck show the road to the river; the nightingales with joyous songs announce the dawn.

Gza speaks to Koncak:—"Since the falcon is flying home to his nest, let us shoot with our golden arrows the falcon's brood."¹¹³ But Koncak said to Gza:—"Since the falcon is flying home to his nest, let us rather ensnare the young falcon with a fair maiden!"¹¹⁴ But Gza said:—"If we ensnare him with a fair maiden, we shall neither keep falcon nor maiden; but the birds will begin to kill us in the fields of the Polovtsi."

XIV.

Boian said:—"Heavy for thee is the head without the shoulders; evil for thee is the body without a head." So is the Russian land without Igor.¹¹⁵

The sun shines out in the sky; Prince Igor is now in the Russian land! The maidens sing on the Danube; their voices roll up across the sea¹¹⁶ to Kiev. Igor rides by the hill Baric, to the holy Virgin of Pirogosca.

¹¹³ *I. e.*, Igor's son Vladimir, who was left behind in captivity.

¹¹⁴ Though evidently against the wish of Gza, who feared any such ties as the probable cause of new misfortunes, Koncak in reality did give his daughter in marriage to Vladimir—a marriage that Igor afterwards ratified in Kiev.

¹¹⁵ The Poles have a well-known comparison of a country without a ruler to

the 'swarm without the queen-bee: cf. Mickiewicz, iv., 354, "bo jak ul pszczół bez matki, tak Polska bez pantjącego trwać nie może."

¹¹⁶ The "sea" here probably means the river "Danube," for the poets of Little Russia have not hesitated to equate the two terms: Jagić (Archiv. II., 2, p. 204) quotes "ponad morem Dunaem," 'over the sea, the Danube.'

All the lands are glad, the cities are gay, singing a song to the old princes, and after them to the young. Let us also sing glory to Igor, son of Sviatoslav, to Bui-Tur Vsevolod, to Vladimir, the son of Igor! Long live the princes and their body-guard, who fight for the Christians against the pagan hosts! To the princes glory and to the body-guard! Amen!

Tikhonravov has added to his text of the "Lay" the account of the same incident as given by the early chroniclers. This I have partially translated here too, by way of commentary and contrast:—

"At that time Igor, son of Sviatoslav, grandson of Oleg, set out from Novgorod on the 20th day of the month of April, on a Tuesday, taking with him his brother Vsevolod of Trubets, his nephew Sviatoslav of Rylsk, and his son Vladimir of Putivl. . . . And when he came to the river Donets, at eventide, Igor looked up to the sky, and saw the sun standing like the moon, and said to his knights and attendants:—'Do you see what that sign is?' They also looked, and saw all; and the men held down their heads, and said:—'Prince! that sign is not for good.' But Igor said:—'Brothers and fellow-soldiers! the secrets of God none knoweth, and of that sign God is Creator as of the whole world, but what it is that God is preparing for us, whether it be for good or for our harm, we shall not fail to see.' And saying this, he forded the Donets, and so came to the Oskol, where he waited two days for his brother Vsevolod, who was going by another road from Kursk. Thence they came to Salnitsa, whither there came to them the spies whom they had sent to collect information." Igor is not discouraged by their unfavourable report: 'If we should return without fighting shame would accrue to us worse than death; but be it as God wills.' "And having resolved thus, they rode on all night, and in the morning of the next day,

Friday, about dinner-time, they met the Polovtsi forces; for they had hastened to meet them, leaving behind them their tents, and, collecting their forces, great and small, were stationed on the further bank of the river Siuril." The Russians disposed their troops in six corps, the divisions of Igor, Vsevolod, Sviatoslav, Vladimir, Iaroslav, and Olstin. Before the battle Igor thus addressed them:—"Brothers! this is what we sought; now let us on!" "and so marched against the enemy, putting his trust in God." In the fight that ensues, the Russians are victorious, and come back to their positions with their booty. But Igor had seen the Polovtsi main body coming up, and would have persuaded his comrades to retreat through the night. Sviatoslav, however, said:—"I have come from afar against the Polovtsi, and my horses are exhausted; if we have to ride away now, we shall just have to stop on the road." So they encamped where they were, and waited for day. "When Saturday dawned, the Polovtsi began the assault, like wild boars, the Russian princes not knowing which side to attack first, for there was an innumerable multitude of the foe. Then Igor said:—"We have wittingly brought upon us the whole land—Kontsak and Koza Burnovic, and Toxobits, and Etebic, and Tertrobic." And so, after counsel taken, they dismounted from their horses, because they wished to fight their way to the river Donets, for they said:—"If we rode away, we ourselves could escape, but we should leave behind us the common soldiers, and that would be a sin against God if we betrayed these our men; let us go on foot, and either die, or live all together." Accordingly they dismounted, and in the fight Igor was disabled in his left hand, at which there was great grief, that the leader was among the first to be wounded. So the fight lasted all that day, and on Sunday morning, the Lord sent on them his anger, "instead of mirth he gave weeping, and sorrow instead of joy, on the river Kaiala."

And now Igor laments that his sins are finding him out: the contrast between the hardy old soldier-writer of the legend, and the monkish composer of the Chronicles, is nowhere more apparent than here. Igor begins his confession:—‘I remember my sins before the Lord my God, how many murders, and blood-sheddings I have been guilty of in the Christian land, for I did not spare the people, but the innocent Christians underwent no small evil.’ He then goes over a long list of offences committed by him, of goods plundered, and men murdered, and women violated, ending with a rhetorical flourish:—‘Where now is my brother, where my brother’s son, my brave soldiers, too? but God is true, and his judgments are righteous altogether; for I no longer have part with the living.’ All the Russian leaders were taken prisoners. Igor, of course, according to the chronicler, takes his captivity humbly; he says:—‘I have received according to my deserts at thy hands, O Lord God; it was not the miscreant power that broke the strength of thy servants: I murmur not at receiving all these evils which have befallen me, for my past wickedness.’ “But the Polovtsi, respecting his position as chief-tain, did him no harm, but appointed fifteen of their young men, and fair young nobles to attend him; he had perfect liberty to go where he pleased, and to hunt with his falcon, with five or six of his own servants,” the guards doing him honour, and obeying his commands unquestioningly. Here again the chronicler shows his hand; he makes Igor send for a priest from Russia, with all the appurtenances of religious service, for “he did not foresee the intentions of God concerning him, but thought that he would have long to stay in captivity. But God delivered him for the prayers of Christianity, for many bewailed him and shed tears on his behalf.” Now at that time there was a man of the Polovtsi named Lavar; this man was stirred by a happy thought, and he said:—‘I will go with thee

into Russia.' After some hesitation, Igor yielded to the friends who counselled him to accept the offer, for his country's sake, if not for his own, and sought an opportunity for flight. "Now it was not possible for him to fly either in the day-time or in the night-time, because of his guards; but he found a suitable time only at the setting of the sun." So Igor sent his groom to Lavor, saying:— 'Cross over to yon side of the Tor with a horse ready bridled,' for he had planned to flee with Lavor into Russia. "When the groom brought back the news that Lavor was awaiting him, Igor rose agitated and trembling, and bowed before the iconostase, and the holy cross, saying:— 'O God, who knowest all hearts, if it please thee to save me unworthy!' and so took the cross and the ikon, and made his escape secretly, while his guards were playing and making merry, for they imagined that the prince was asleep. So he came to the river, and forded it, and there he mounted his horse, and so they both rode away. This deliverance God wrought for him on a Friday, in the evening. And in eleven days he reached the town Donets, whence he journeyed to his own city, Novgorod, to the great joy of all. From thence he came to Cernigov, and so to Kiev, to the Grand Duke Sviatoslav, who rejoiced greatly at seeing him return."

ROBERT ATKINSON.

SOME LEGAL AND CONSTITUTIONAL POINTS IN CICERO, HORACE, AND OTHERS.

I. CICERO, *Phil.*, II., 33.

Ecce Dolabellae comitiorum dies: sortitio praerogativae:
quiescit. Renuntiatur: tacet.

OF the praerogativa, Merivale says:—"The prerogative century was chosen by lot *from the hundred and ninety-three which constituted the whole number*, to give its decision first. The peculiar influence which it exercised over the rest is referred to by Cicero (*pro Planc.* 20): 'Centuria praerogativa tantum habet auctoritatis, ut nemo unquam prior eam tulerit quin renuntiatus sit.' I am quite unable to explain this startling assertion." *Hist. R. under Empire*, i., p. 441, large edition.

The following note explains Cicero's assertion, and in so doing corrects Merivale's impression that the prerogative was taken from the total, 193 centuries.

The voting, referred to in *Phil.* ii., is for the Consular Election, at the comitia Centuriata, where the voting was by centuries (*Quint. Cic. de Pet. Cons.*, viii., 32). Hence with *praerogativae, centuriae* is understood. The praerogativa consisted of a single century, as is plain from Livy: *...um sors praerogativae Aniensi juniorum exisset, eaque Otacilium, M. Æmilium Regillum consules diceret, tum Fabius, silentio facto, tali oratione est usus (xxiv. 7).* Fabius concludes with—*Praeco, Aniensem juniorum in*

suffragium revoca (*ib.* 8). Then (*ib.* 9), Iterum praerogativa suffragium init.

Another passage in Livy, xxvi., 22, proves two things: first, that only one century voted: Praerogativa Voturia juniorum T. Manlium Torquatum et T. Otacilium absentem consules dixit; and second, that it was its final vote which was of weight. In this case the final vote was influenced by the advice of the senior century, and not by jus gladii as before: senioribus dimissis juniores suffragium ineunt. It also shows the weight of the prerogative vote: auctoritatem praerogativae omnes centuriae sequutae sunt (Liv. xxvi. 22). The whole passage should be read.

The weight of the prerogative vote was due originally to religion: praerogativam etiam majores omen justorum comitiorum esse voluerunt (Cic. *de Div.*, i. 45, 103). The inference is inevitable that the prerogative was eligible from the first class only. The avowed object of the Servian constitution was to give the preponderance to the conservatives; and it is impossible to suppose that the annual elections could have been such a farce that the Optimates could always secure a favourable vote in the remaining classes. If we suppose the prerogative confined to the first class, all is easy: the century chosen by lot represents the political views of its class, to which it gives the religious sanction of the omen (Cic. *l. l.*)

We must recollect that Rome like England was governed by parties. At the present hour, the conservative vote in any one portion of the United Kingdom might safely be taken as an indication of the conservative constituencies. This would also happen in Rome, and the vote would be in addition fortified with the sanctions of religion. Fabius (Liv., *l. l.*) relied somewhat on the temporal weapon, *imperium merum*, in dealing with the praerogativa. The Romans, like most Formalists, were somewhat free in their views as to the best means of securing conformity.

That the praerogativa was taken from the first class only may be proved arithmetically from Cicero, *de Rep.*, ii. 22.

He says that the centuries not in the first class were 104, and that 8 taken from these and added to the first gave a majority. That is

$$\begin{aligned} 104 - 8 &= 96 \\ \therefore \text{1st class} + 8 &= 97 \end{aligned}$$

For, 18 centuries of knights, 1 of engineers, 70 of the first, and 8 of the second = 97. But if the praerogativa was not taken from the first exclusively, then, in certain cases, less than 8, *i. e.* 7, from the second, would make a majority: *i. e.*

$$70 + 18 + 1 + 7 + \text{Praerogativa} = 97.$$

That Cicero, as a lawyer, a statesman, and an active electioneering agent, could be ignorant of the number of centuries in the first class, is incredible.

II. CICERO, *De Legibus*, III., 17.

ATT. Mihi vero nihil umquam popolare placuit eamque optimam rem publicam esse dico, quam hic consul constituerat, quae sit in potestate optimorum. M. Vos quidem, ut video, legem antiquastis sine tabella. Sed ego, etsi satis dixit pro se in illis libris Scipio, tamen ita libertatem istam largior populo, ut auctoritate et valeant et utantur boni. Sic enim a me recitata lex est de suffragiis: OPTIMATIBUS NOTA, PLEBI LIBERA SUNTO. Quae lex hanc sententiam continet, ut omnes leges tollat, quae postea latae sunt, quae tegunt omni ratione suffragium, ne quis inspiciat tabellam, ne roget, ne appellet. Pontes etiam lex Maria fecit angustos.

The imaginary law repeals all previous enactments

quae tegunt omni ratione suffragium—which aim at absolute secrecy and independence by forbidding altogether

1. Inspection of ballot,
2. Asking for a particular vote,
3. Calling on people to vote in a particular way.

Cicero also proposes to repeal the Lex Maria which made the approaches to the ballot-box narrow, and thereby excluded those whose presence might intimidate the voters—*pontes fecit angustos*.

Cicero retains the ballot, but allows the voter, if he pleases, the power of showing his paper unasked (*ultro*) *optimo cuique et gravissimo civi*, and of thereby complimenting *bonis* or *optimatibus*.

But such showing is to be voluntary : *ut in eo sit ipso libertas*.

Thus Cicero precludes all tampering with voters previous to the actual tender of the vote, but subjects those who do not show their papers to the inference that they did not vote as the *boni* wished.

In other words, the voter who showed his paper would be influenced by a sense of favours to come, as well as of favours past ; and, by showing his paper, would also give rise to a presumption as to those who did not.

Hence, *libertatis species datur*, and species only ; as it would give rise to two categories of voters :—

1. The open voters who are to be petted,
2. The secret voters who are to be snubbed, by the leading men.

III. TACITUS, *Ann.*, XIII., 26.

Sed consules, relationem incipere non ausi ignaro principe, perscripsere tamen consensum Senatus : ille an auctor constitutionis

feret, ut inter paucos ei sententiae adversos, quibusdam coalitam libertate irreverentiam eo prorupisse frementibus, vine an aequo cum patronis jure agerent sententiam eorum consultarent, ac verberibus manus ultro intenderent? Impulere vel poenam suam dissuadentes, *quid enim aliud, &c.*

With this punctuation, sense may be elicited, *i. e.*, quibusdam *senatoribus* (*i. e.* patronis) frementibus eo prorupisse irreverentiam libertorum, ut indignantes quaesissent patroni, num liberti patronos, vine an aequo jure transigendum foret, consulturi essent, atque patronis injurias oblaturi essent liberti.

Fremere is to ask indignantly, and so takes the oblique; *cf.* totis passim castris fremitu orto *quid, &c.* Liv., iii., 7.

fremis indignata juvenus
Cetera cur maneant castris.

STAT. *Theb.*, x, 223-4.

Ut before *vine* would make the construction clear: the original may have run FREMENTIBVTVI = frementibus ut vi: but the text may stand if *frementibus* is allowed to include the interrogative particle governing *consultarent* and *intenderent*.

The nominative to *impulere* is *senatores* deprecating *poenam*, the penalty, *suam*, allowed them by the proposed *constitutio*; and the object is *principem*.

Poenam suam is not poena libertorum, as Ritter, Orelli, and Dureau de la Malle take it, and which would rather be suam poenam, but is poena quam patroni sumerent. For this sense of suam, *cf.* the phrase litem suam facere, to make the interest in a suit one's own. This common phrase probably suggested poenam suam to Tacitus.

The whole passage from *ille* (c. 26) to *adimeretur* in c. 27 is the report of the debate. Part of this, down to *intenderent*, Tacitus gives by way of quotation from the

consular report. The rest he gives in his own person (impulere, disserebatur), though doubtless drawing from the same authority.

IV. HORACE, *Sat.* 1. vi., 17-25.

Quid oportet
 Nos facere a vulgo longe longeque remotos ?
 Namque esto, populus Laevino mallet honorem
 Quam Decio mandare novo, censorque moveret
 Appius, ingenuo si non essem patre natus :
 Vel merito, quoniam in propria non pelle quiessem ;
 Sed fulgente trahit constrictos gloria curru
 Non minus ignotos generosis. Quo tibi, Tilli,
 Sumere depositum clavum fierique tribuno ?

If no Roman history existed, the moods and tenses alone ought to have made the argument clear. It is as follows :—*What am I to do who had a slave for a father ? If ignoti were totally excluded from office* (which is not true, for Decius was returned in place of Laevinus) *and from the Senate* (which is equally false, as Appius called up the freedmen in 442, Appii Claudii censura . . . qui senatum primus libertinorum filiis lectis inquinaverat, *Liv.* ix. 46), *in spite of the love of distinction which is common to high and low, it would serve them right. But though this is not the case, I am warned by the case of Tillius and others, and by my own tribunate, to keep clear of politics.*

The usual explanation that the allusion is to the drastic censorship of Appius, 50 B. C., is contrary to the argument and to the Latin : the tense of mallet shows the condition is not fulfilled, and proves that the condition in moveret is likewise unfulfilled.

There is no instance of a second imperfect denoting a fulfilled condition, when its predecessor denoted an unful-

filled condition: si non essem is not an instance to the contrary; it is dependent on moveret, and is therefore subjunctive; and as moveret is past, essem is also past. Whereas, in the hypothesis Horace contemplates, both suppositions moveret and mallet are co-ordinates. After the long parenthesis from 19 to 44, Horace resumes—Nunc ad me redeo. The crying sin of the Satires is a juvenile taste for parenthesis.

V. *Sat.* I., ix., 36–37.

— respondere vadato

Debebat; . . . quod ni fecisset, perdere litem.

The sequel is:—

Venit obvius illi

Adversarius, et “quo tu, turpissime?” magnâ

Inclamat voce; et “licet antestari.” Ego vero

Oppono auriculam. Rapit in jus; clamor utrinque;

Undique concursus.—(vv. 74–78.)

According to Gaius, “in summâ sciendum est eum qui (*in jus vocat*) r(e)m v(i) p(er)agere, et eum qui vocatus est (*tra(he)r(e)* posse,” iv. 183; that is, the plaintiff had the right of forcible arrest, and this under the XII. Tables:—“si in jus vocat, ni it, antestator; igitur em capito.”

On appearing in court, unless the case was concluded on the same day, the defendant (vocatus in jus) was required to give bail (vadimonium) for future appearance (cum autem in jus vocatus fuerit, ni eodem die finitum fuerit negotium, vadimonium ei faciendum est, id est, ut promittat se certo die sisti.—*Gaius*, iv. 184.)

These engagements were sometimes *pura* or *sine satisfactione*, i. e., resting on the defendant's personal security only; others were further assured, by sureties, by oath, recuperatoribus suppositis, id est, ut qui non steterit, is proti-

nus a recuperatoribus in summam vadimonii condemnentur ; and for all these cases the rules were published in the Praetor's Edict—*eaque singula diligenter praetoris edicto significantur* (*Gaius*, iv. 185).

From this, one thing is certain : that, if recuperatores could mulct the defendant, in case of default, to the full extent of the vadimonium, in all other cases the defendant could not be mulcted to that amount.

Recuperatores might be appointed by the Praetor, *i. e.*, under his Edict, for all cases between Romans and Peregrini within the First Milestone, and outside it for all cases, whether both, or one, or neither, were Romans or not. That is, all issues of fact between two cives within the First Milestone were decided by a simple judex under the Lex Julia, and all issues of fact between (1) Peregrini exclusively, or (2) Peregrinus and Roman, within the First Milestone, were decided by recuperatores ; and outside it, between any parties whatsoever, were decided *either* by recuperatores *or* by a single judex : in either case, *continenti imperio*, by the authority of the magistrate for the time being. The recuperatores could at once (*protinus*) give damages to the full amount (*Gaius*, iv. 185).

According to Gaius, it was only in actions *judicati* and *depensi* that the vadimonium was laid *quanti res erit*. Hence, *perdere litem* means that the defendant had forfeited his vadimonium = *lis*, the subject-matter of the original action, which must have been either *judicati* (a judgment debt), or *expensi* (money paid on another's liabilities). It was in these two actions that the Lex Valeria, U. C. 412, preserved forcible arrest (*Gaius*, iv. 25), which was abolished in other cases. In the time of Gaius the defendant gave sureties.

G. Long (*Verr.* II., iii. 15), with whom Mr. Maclean *ad loc.* agrees, says of rapit in jus :—"The scholiast on Horace, Porphyrio, understands the passage to mean that, as the

man did not appear according to his 'vadimonium,' the 'adversarius' arrested him to drag him before the Praetor . . . but here again there is contradiction, for the 'in jus vocatio' is the first step in a suit." But the object of *in jus vocatio* and of *vadimonium* were the same—to get the defendant to appear, that the plaintiff might obtain the benefit of the Edict either by a judex or by recuperatores. Surely recuperatores were not appointed *before* the vadimonium, but as part of it. Surely the defendant had two courses open to him, viz., to submit to iudicium, and have the case so decided, or by default to have judgment entered against him on the summary finding of the recuperatores. But before the recuperatores could so act, the Praetor must have given some direction to that effect (*si paret, &c.*). And would not everything outside the finding of the recuperatores be strictly in jure as opposed to in iudicio?

Why, then, did not the Adversarius allow judgment to go by default against the Bore, if he by default debebat perdere litem? In other words, why did the plaintiff go to the trouble of arresting the defendant? Paulus, D., 2, iv. 19, and Julianus, furnish the answer: Satis poenae subire eum, si non defendatur et latitet, certum est quod mittitur adversarius in possessionem bonorum ejus. Sed si aditum ad se praestet aut ex publico conspiciatur (like the Bore,) recte in jus eum vocari Julianus ait. The same Title (iv. 19) shows that the *in jus vocatio* retained its character of forcible arrest, as Gaius lays down that a man could not be summoned in his own house, "quia domus tutissimum cuique refugium atque receptaculum sit, eumque qui inde in jus vocaret vim inferre videri."

There was a further use of adding a penalty besides securing an appearance; if no penalty were annexed for default, the action would be *incerti*: "incerti enim cum eo

¹ Orelli, with Porph., takes rapit in jus v. 77 = rapit ad praetorem, vel cvv.

agendum esse in id quod interest verissimum est et ita Celsus quoque scribit," D., 2, v. 3. But as the Bore had fixed the penalty at the full amount of the original claim, the Praetor could appoint recuperatores to cast him at once (protinus) for the full amount. It is safer to apply these suppositions of the case than to hold Horace—a government official—ignorant of every-day law.

In *Gaius*, iv., 183, the italics are supplied by Huschke. The sense is good, and is supported by the passage D., 2, iv. 19, cited above. That the early Roman Litigation was a mimicry of War need not be proved, but may be best illustrated by Ennius *ap.* Gell., xx. 10—

Non ex jure manum consertum, sed magis ferro
Rem repetunt,

and by the comment of Aulus Gellius—quod videtur dixisse (*sc.*, Enn.) conferens *vim illam civilem et festucariam quae verbo diceretur non quae manu fieret*, cum vi bellica et cruenta (Aul. Gell., xx. 10). The military metaphor is kept up by Horace in the words *clamor* and *concursus*.

VI. *Sat.*, II., iii., 64-76.

Insanit veteres statuas Damasippus emendo :
Integer est mentis Damasippi creditor.—Esto !
"Accipe quod nunquam reddas mihi," si tibi dicam,
Tunc insanus eris, si acceperis ? an magis excors,
Rejecta praeda, quam praesens Mercurius fert ?
Scribe decem a Nerio ; non est satis ; adde Cicutae
Nodosi tabulas centum, mille adde catenas :
Effugiet tamen haec sceleratus vincula Proteus
Quum rapies in jus malis ridentem alienis,
Fiet aper, modo avis, modo saxum et, quum volet, arbor.
Si male rem gerere insani est, contra bene, sani ;
Putidius multo cerebrum est, mihi crede, Perilli,
Dictantis, quod tu nunquam rescribere possis.

In this passage we must consider,

1. The readings and their meaning ;
2. The logic ; and
3. The Law.

I. The preposition *a* (Scribe decem *a* Nerio) is erased in S, and omitted by the Scholiast on Persius, ii. 14. It is then hardly necessary to argue for its retention.

The preposition in such cases denotes the person or fund charged :

Ego quidem pro istac rem solvi *ab* tarpessita meo,

(Plaut., *Curcul.*, 618) ; cf. *id.*, 721-722 :

CA. Tum me sequere. TH. Quo sequar te ? CA. Ad tarpessitam meum,

Ad praetorem : nam *inde* rem solvo omnibus quibus dehibeo.

(ut . . . *ab Equatio* solvat, Cic. *Att.* vii. 17 ; *a vobis* persolvere, p. *Plan.* 103 ; *ab A. Sextilio* dicit se dedisse, p. *Flacc.* 35 ; se a me solvere, *Att.* v. 21 ; *a Faberio* repraesentabimus, ib. xii. 25 ; si praetor dedit, *a quaestore* numerabit, quaestor a publica mensa, p. *Flacc.* 44.)

Horace himself explains it ; as it is plainly the correlative of *rescribo*, which is "to repay on account" :—

illud mihi

argentum rursum jube rescribi, Phormio,

(Ter., *Phorm.*, 922) : therefore *scribe* is "borrow on account."

The meaning will be seen more exactly when we consider the law of the case.

II. The logic of the passage is clear enough :—*A mad world, my master ! I am mad because I dabble in bric-a-brac on credit : but the dealer who gives me credit will, in spite of every precaution, never get a penny out of me.*

III. The Law of the case is as follows :—I, Damasippus, buy statues on credit from Perillus : I therefore owe him the money under the contract *emptio venditio*, i. e., he can

sue me *ex vendito*. This contract, being consensual, is *bonae fidei*, and the action admits of all kinds of equitable pleas, even during the course of the suit; but if Perillus *dictet*, i. e., directs Nerius—a usurer or banker—to enter in his (Nerius') book HS.X as paid out (*expensa*) to Damasippus, the contract is novated into one *stricti juris*, and all equitable pleas are thereby precluded. Damasippus is thus reduced to the *exceptio non numeratae pecuniae*, i. e., no consideration. But this plea could be barred by the creditor producing a written acknowledgment of the debt, and specifying its origin. Even this acknowledgment in turn could be evaded by Damasippus, *evidentissimis probationibus in scriptis habitis sese haec indebita promisisse* (D., xxii., 3, 25, 4). So that the meaning is, though the creditor exhaust the skill of the draftsman, he'll never get a penny out of Damasippus.

That Cicuta is probably not Nerius, is shown by Mr. Poste's citation (*Gaius*, pp. 410, 412) of *Dig.* ii., 14, 9, to the effect that the debt could be entered with several bankers. Of course each entry would be a distinct proof of the one debt. *Tabulas centum* would be then the several documents acknowledging the debt and the consideration: *catenas* would be the stringent clauses which the draftsman thought would bind Damasippus, the word itself being suggested by the story of Proteus.

Everything seems in favour of four distinct persons: (1) the debtor, Damasippus; (2) the original creditor, Perillus; (3) the novated creditor, Nerius; and (4) the conveyancer and perhaps second novated creditor, Cicuta. If, on the other hand, Nerius be identified with Perillus, *dictantis* has no meaning, for it is now admitted that the entry of the debtor's name by the creditor was the ground of action; *vide* Long's Preface to *Cic. pro Roscio* (*Orat.* vol. ii.).

The passage is also rendered somewhat obscure by two Latin usages:—first, the hypothetical imperative *scribe* = *si*

scribat creditor; and second, (*tu V. 76*) used for anybody and so for the speaker Damasippus = ego. I have developed this point in a paper in the *Journal of Philology*, vol. ii., p. 183, on the Sixth Satire of Persius, the misunderstanding of which I think is due to these two usages.

VII. *Epod.* iv., 16.

Othone contempto.

Otho of course intended to add consideration to the knights by giving them a separate place,

Sic libitum vano qui nos distinxit Othoni;

but this low fellow by his presence disgraces the order, and thereby violates the spirit of the Law. By *vano* Juvenal expresses his contempt for the honour, like a true Roman, *apud quos vis imperii valet, inania tramittuntur*, Tac. *Ann.* xv. 31. The letter of the law could not have been violated in this instance; and, if not the letter, the alternative is inevitable.

VIII. *Epist.*, i. xx., 28.

Collegam Lepidum quo duxit Lollius anno.

Duxit = "showed the way to," "ushered in," *cf.* *nox ducere diem videtur*, Tac., *Germ.*, 11.

Dixit is used of the official nominator, which Lollius was not.

In the passages referred to by Doering: in *Liv.* vii., 24, Camillus as dictator had restored the consulate, was made consul by the senate, and then collegam Appium Claudium *dixit*; in *Liv.* xxxvii., 47, Fulvius consul unus creatur, as the other candidates had not polled the minimum (*quum ceteri centurias non explessent*); *isque postero die Cn. Manlium collegam dixit*. In the present case there was no exercise of imperium, acc. to Dio. Cass., liv., 6,

ἐν ᾧ δὲ ταῦτα ἐγένετο, ὁ Αὐγουστος ἐς Σικελίαν ἦλθεν, ὅπως καὶ ἐκεῖνην καὶ τὰλλα τὰ μεχρὶ τῆς Συρίας καταστήσῃται. Καὶ αὐτοῦ ἐνταῦθα ἔτι ὄντος, ὁ δῆμος τῶν Ῥωμαίων τοὺς ὑπάτους χειροτονῶν ἐστασίασεν, ὥστε καὶ ἐκ τούτου διαδειχθῆναι ὅτι ἀδύνατον ἦν δημοκρατουμένους σφᾶς σωθῆναι. Μικροῦ γοῦν τιнос ἐν τε ταῖς ἀρχαιρεσίαις καὶ ἐν ταῖς ἀρχαῖς ἐν ταῖς κυριεύοντες ἐθορύβησαν. Ἐτηρεῖτο μὲν γὰρ ἡ ἐτέρα χώρα τῷ Αὐγούστῳ, καὶ διὰ τοῦτο Μάρκος Δόλλιος κατ' ἀρχὰς τοῦ ἔτους μόνος ἦρξεν· ἐκεῖνου δὲ μὴ δεξαμένου αὐτὴν Κύντος τε Λέπιδος καὶ Λούκιου Σιλανὸς ἐσπουδαρχίασαν, καὶ οὕτω γε πάντα συνετάραξαν ὥστε καὶ τὸν Αὐγουστον ὑπὸ τῶν ἐμφρόνων ἀνακληθῆναι. ἐπειδὴ δὲ οὐχ ὑπέστραψε μὲν, ἐλθόντας δὲ αὐτοὺς πρὸς αὐτὸν ἀπέπεμψεν ἐπιτιμήσας σφίσι καὶ κελεύσας ἀμφοτέρων αὐτῶν ἀπόντων τὴν ψῆφον δοθῆναι, οὐδὲν μάλιστα ἡσύχασαν, ἀλλὰ καὶ πάνυ αὐθις διηνέχθησαν, ὥστε τὸν Λέπιδον ὀψέ ποτε αἰρεθῆναι.

This passage expressly states that Lepidus was elected in the usual way.

IX. *Carm.* III., xxiv., 4.

et mare publicum.

Publicus is opposed to *privatus* in reference to ownership: publica privatis discernere, A. P., 397, publica materies privati juris erit, *ib.* 131. In *Ov. Metam.*, vi., 351 quoted by Wickham,

in publica munera veni,

publica means provided by the State as Landlord, and so open to all: cf. *Propert.* III., xviii., 24.

torvi publica cymba senis.

In reference to enjoyment, what is opposed to *communis* is *proprius*; this at once establishes the meaning of

difficile est proprie communia dicere:

A. P. 128.

It is difficult to appropriate what all have equal rights to.

X. JUVENAL, *Sat.*, I., 110.

Sacro nec cedat honori.

I.e., se parem gerat: to jostle the magistrate, and not leave the way and uncover as well-bred Romans did:—si consulem videro aut praetorem omnia quibus honor haberi honori solet faciam; equo desiliam, caput adaperiam, semita cedam. Sen., *Ep.* 64, 10. As to cedo c. dat., cf., Verg., *Aen.*, iii., 484, nec cedit honori, *i.e.*, *par est*, is equal to the occasion in showing respect for Ascanius. Calp., ii., 93,

Carmina poscit amor, nec fistula cedit amori.

E contra Stat., *Theb.*, v., 698 :

versusque dolor dat terga timori,

i.e., *impar est*.

XI. CALPURNIUS, *Ecl.*, IV., 117-121.

Jam neque damnatos metuit jactare ligones,
Fossor et invento, si fors dedit, utitur auro;
Nec timet ut nuper, dum jugera versat, arator
Ne sonet offenso contraria vomere massa.

This obviously refers to a change in the law of treasure-trove which is due to Hadrian. Hadrian gave the property in treasure-trove to the finder. Just. *Inst.* 2, 1, 39. Hence the finder did not fear the claims of the fiscus like the fisherman in Juvenal. This would fix Calpurnius as the poet of Commodus: not of Nero (Teuffel, vol. 2, 92), nor of Carinus (Gibbon, cap. xii.) Nuper would thus indicate some lapse of time, and Calpurnius uses the legislation of Hadrian—the founder of the Ælian line—to glorify Commodus, his lineal representative. Hadrian was to Commodus what Julius Cæsar was to Nero, the representative of the gens.

As to the prosody of Calpurnius, there are no parallels in the Neronian era to

gramine sparget. ii., 22.
mittito clausos, v., 24.

How can Teuffel say "in Calpurnius final o is used short only in agreement with the strictest poets?"—*Lat. Lit.* 2, 93.

Caeditō, Prop., v., 5, 77, is proved false by addite in the next line, and is queried in L. Mueller's index. Reponitō in Gratius, *Cyn.*, 56, is the only instance in the severer style. Ovid's estō, Tr., iv., 3, 72, and Juvenal's sumitō, viii., 134, occur in writings sermoni propiora..

XII. M. ANTONINUS.

The seventeen sections of the first book commence each with *παρὰ*, and have no verb.

If we assume that the Emperor, imitating the acceptatio of the Roman Codex, entered his moral advantages and opportunities as due to certain persons, *παρὰ* would represent *a*, and no verb is required: so we may render it, I could draw on my grandfather Verus for good morals.

XIII. CICERO *de Officiis*, iii., 4, *Formula Stoicorum*.

The substance of *Formula Stoicorum* is well known to the readers of Butler's Sermons. The use of the word in mathematics misleads us as to Cicero's meaning. Cicero as a lawyer uses a legal term in the lawyer's sense, and his modern reader takes it in the sense of rigorous mathematical statement. The Roman formula had nothing to do with mathematics, but denoted the very opposite to scientific strictness.

Formulæ were introduced by the Aebutian and Julian Laws in order to do substantial justice to a suitor, whose

claims were liable to be defeated by the rigour of technical pleading. For example: under the older state of things a plaintiff failed if he sued for damage to his *vines* when he ought to have used the term *trees* as laid down in the Twelve Tables. The formula allowed statements which were only approximately true, and were often notoriously false, provided they worked substantial justice. The formula was often grounded on a fiction which could not be questioned, exactly like the lesser, entry, and ouster of John Doe. Cicero in using the phrase *Formula Stoicorum* does anything rather than pledge himself to the scientific accuracy of the statement. What he means is that the rule will work as a rule of conduct; that is, that a man will avoid torture, but that he is in duty bound to avoid injustice still more; and these two *fugienda* appear for practical purposes on the face of the formula.

This agrees with Cicero's own account:—

Itaque, ut sine ullo errore *dijudicare* possimus, si quando cum illo, quod honestum intelligimus, pugnare id videtur, quod appellamus utile, formula quaedam constituenda est: quam si sequemur in comparatione rerum, ab officio nunquam recedemus, iii., 4, 19.

Cicero does not notice that the Stoics differed as to the meaning of *contra naturam*. Its opposite *κατὰ φύσιν* meant:

1. Subjective consistency; this was the view of Zeno, *ὁμολογία παντὸς τοῦ βίου*. Diog. L., vii., 89.

2. Objective conformity to

(a) nature = *ὅπερ ἐστὶ κατὰ τὴν αὐτοῦ καὶ κατὰ τὴν τῶν ὄλων*. Chrysipp. ap. Diog. L., vii., 87.

(b) *τὴν κοίνην μόνην φύσιν*, Cleanthes, Diog. L., vii., 89.

Cleanthes thus was the head of the strictest sect of Stoics, and his asceticism is also seen in his theory of pleasure. Sext. Emp. adv. Math., xi., 73.

THOMAS MAGUIRE.

GALWAY.

GIBBON AND JULIAN.

IN the long list of emperors between Constantine, sometimes called Isapostolos, and Constantine Palæologus, inclusive, we find the name of one man only who deserted the Christian faith. And the fact that this solitary apostate was, by many degrees, the best man of the series, must plainly have been a source of considerable, though perhaps secret, satisfaction to a writer of Gibbon's anti-theological views. Hence there certainly is, at first sight, good ground for suspecting that the portrait of Julian, admitted by all to be one of the master-pieces in the "Decline and Fall," may be unduly favourable; and that the large amount of praise of the apostate, which undoubtedly is to be found therein, is to be received with as much hesitation as if we read it in the panegyric by Mamertinus.

Unluckily for Julian's reputation this lawful ground for suspicion has been confounded with actual proof, and, in this country at least, the great majority of those who ever heard of either Julian or Gibbon assume, as incontrovertible, that the life of the former apostate by the latter is to be regarded in the light of an encomium, or at least an apology.

The design of the present paper is to show that this popular view is altogether erroneous. Gibbon is really very hard on Julian; avails himself of every opportunity of censuring his conduct, and in some instances treats him with serious injustice. I shall confine myself strictly to the consideration of the treatment which the emperor

has met with from the historian. As for myself, I believe that, whether we choose to terminate the imperial list with Constantine XIV. at Constantinople, or with Francis II. at Vienna, Julian was, both morally and intellectually, the best man of them all; but upon the question concerning his merits, comparative or absolute, I do not mean here to enter—we may, with Claudius Mamertinus, regard him as raised above all taint of human infirmity; or, with S. Gregory Nazianzen, as reeking with “unpurged blood” of children, shed in the loathsome recesses of his palace, in his accursed necromantic rites.

Assuming for a moment the truth of what I hope to be able to establish—that Julian was harshly dealt with by Gibbon,—it is by no means difficult to assign a perfectly satisfactory explanation of this, at first sight, unlikely treatment. We need only bear in mind the fact that the *History of the Decline and Fall* was published in separate instalments. The first of these, which appeared in 1776, brought the work down to the end of the sixteenth chapter, thus including the famous attack on the Christian religion. In an age of free discussion, when the fundamental postulates of every theological system are openly criticised in every literary periodical, we do not easily realize the commotion excited by the fifteenth and sixteenth chapters. “All the religious party,” writes M. Guizot, “so numerous and respected in England, united to condemn the last two chapters of the volume, the fifteenth and sixteenth of the work, which contain the history of the establishment of Christianity. Many and loud were their protests. To Gibbon these were unexpected and startling. ‘Had I believed,’ he said in his memoirs, ‘that the majority of English readers were so fondly attached even to the name and shadow of Christianity; had I foreseen that the pious, he timid, and the prudent, would feel, or affect to feel, with such exquisite sensibility, I might, perhaps, have

softened the two invidious chapters, which would create many enemies and conciliate few friends.'"

We can scarcely doubt that this religious storm reacted unfavourably on the portrait of Julian. Gibbon had established his reputation as an unbeliever, and had now such an opportunity as would not occur again, for airing his impartiality before an indignant public. One passage in his autobiography sufficiently discloses his attitude of mind in depicting the apostate's character. "My ecclesiastical history," he writes, "still breathed the same spirit of freedom, but Protestant zeal is more indifferent to the characters and controversies of the fourth and fifth centuries. My obstinate silence had damped the ardour of the polemics. Dr. Watson, the most candid of my adversaries, assured me that he had no thoughts of renewing the attack, and my impartial balance of the virtues and vices of Julian was generally praised." I need hardly remark that the mere fact of the general praise of this "impartial balance," by a bigoted and exasperated Christian dikastery, is wholly inconsistent with the theory of indiscriminating panegyric. We see that Gibbon's professed aim was impartiality, or rather a reputation for impartiality. But, circumstanced as he was, such reputation could be gained only by censuring Julian. That he availed himself to the utmost of every opportunity of displaying this "impartiality" I must now, so far as space permits, proceed to show.

I. The history of Julian's first campaign, related by Ammianus in his sixteenth book, deserves our special attention; being the history of a military expedition headed by a dreamy university student, forcibly taken from the schools, and, without preparation, made commander-in-chief—in the words of Ammianus, "*adulescens primævus, ut Erechtheus in secessu Minervæ nutritus, ex academiae quietis umbraculis, non e militari tabernaculo, in pulverem Martium tractus.*" Ammianus,—himself a

veteran,—was thoroughly competent as a military historian; and his work has, moreover, the great merit—in Julian's case unique—of rigid impartiality. Of this latter prerogative the mere fact that it has been a matter of dispute among competent scholars whether he was, or was not, a Christian, seems to be ample evidence. We find him accordingly, though the general tenor of his history is highly favourable, nevertheless, censuring Julian with great rigour, whenever his conduct appeared to merit reprehension.

Julian himself, in the *Epistola ad S.P.Q. Atheniensem*, describes his introduction to military life as being wholly contrary to his own will. He complains of the *Θεταλικὴ πειθανάγκη* to which he was subjected, mourns over the loss of his beard, and scorns the military cloak—"οὐδὲν γὰρ μοι τοῦ καλλωπισμοῦ τῶν καθαρμάτων ἤρμοζεν."

Certainly we should expect from a panegyrist criticism at all events lenient, of the performance of a general who appears to have been still learning the goose-step when actually commander-in-chief—"Artem modulatus incendi, per pyrricham, concinentibus fistulis, disceret." But Gibbon sums up the history of the campaign—"He advanced to the banks of the Rhine, surveyed the ruins of Cologne, convinced himself of the difficulties of the war, and retreated on the approach of winter, discontented with the court, with his army, and with his own success." "Vincendi primitiis lætus" are the words of Ammianus, and they will scarcely bear the rendering, "discontented with his own success." Gibbon adds a note—"Ammianus appears much better satisfied with the success of this first campaign than Julian himself; who very fairly owns that he did nothing of consequence, and that he fled before the enemy."

Ammianus seems indeed to be well satisfied with the
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results of the campaign, for he sums them up as follows:—"strata Germania, pacatisque rigentis Rheni meatibus, cruenta spirantium regum hic sanguinem fudit, alibi manus catenis adflixit." But the remainder of Gibbon's note seems to be destitute of any foundation. It contains two statements: (1), Julian owns that he did nothing of consequence; (2), Julian owns that he fled before the enemy.

Gibbon gives no reference; but there can be no doubt he had in his mind a passage in the Athenian epistle, which, in Spanheim's edition—the edition used by Gibbon—reads as follows:

Οὐ κακῶς δέ, ὥς ἀκηκόατε, τοῦ
πρώτου στρατηγηθέντος ἐνιαυτοῦ,
καὶ πραχθέντος σπουδαίου, πρὸς τὰ
χειμάρδια πάλιν ἐπανελθὼν, εἰς τὸν
ἔσχατον κατέστην κίνδυνον.

Igitur cum, ut audistis, primo
anno male administratae res
essent, nec ullum factum esset
operae pretium; ubi ad hiberna
redii, in extremum sum discri-
men adductus.

Can it be possible that the learned and usually careful historian has been here led into error by confining his attention to the Latin version? The passage affords a beautiful example of what constantly occurs in Spanheim's slovenly edition of Julian's works—a Latin version of a different Greek text. Spanheim introduces numerous emendations; but intrepidly prints, in parallel columns with the altered text, the unaltered translation of Petavius, thus rendering the book a trap for the careless student. The fact is here that the word οὐ was inserted by Spanheim on the authority of the following note of Petavius: "~~scripsisse~~ puto Julianum, οὐ κακῶς δὲ ὥς ἀκηκόατε: ac mox, ~~πραχθέντος~~ τινὸς σπουδαίου." Unfortunately, the Vossian MS., our only authority for this important epistle, is defective just at the critical spot. Hertlein's critical note is—"in V [codex Vossianus] periit ου, charta perrosa, quod secundum

Petavium reposuit Spanh." This emendation of the text by Petavius seems indispensable to suit the context ; but, whether it be adopted or not, it is plain that Gibbon, in using the passage as a confession of failure from Julian himself, should have called attention to the doubtful reading, of which, assuming that he read the Greek text, he must have been aware.

As for the second statement, that Julian owns that he fled before the enemy, it seems that Gibbon must have hastily referred the "extreme peril" to some occurrence on the march returning to winter quarters, and hence to have taken for granted unseemly velocity of retreat. But anyone who reads the document will see at a glance that the "peril" had nothing to do with the march, but arose from a sudden attack on his winter quarters, which shut him up in Sens for thirty days.

So here, at least, we find no traces of the panegyrist. And similarly, with respect to another episode in the same campaign—the ambuscade of the Allemanni—we find Gibbon greatly exaggerating Julian's disaster. Where Ammianus says, "*hostes . . . legiones duas arma cogentes adorti paene delessent, ni subito concitus clamor sociorum auxilia coegisset,*" Gibbon paraphrases, "Before the inevitable disorder could be remedied, two legions were destroyed ; and Julian was taught by experience that caution and vigilance are the most important lessons of the art of war." Even of the great battle of Strasburg, fought in the next campaign, in which Julian, with 13,000 men, encountered 35,000 of the bravest warriors of Germany ; utterly routed them ; and, with a loss of but 243 of his own soldiers, left 6000 of the Allemanni dead on the field, while "*inaestimabiles mortuorum acervi per undas fluminis ferebantur,*" Gibbon can find no higher praise than this—"We are at a loss to discover any of those strokes of military genius which fix the attention of ages on the conduct and success

of a single day." This may be true, but certainly cannot be regarded as an extravagant encomium on the young captain, who, as Ammianus tells us, arrested his flying cavalry, "velut repagulum;" whose conduct is, by the same very competent authority, compared to that of Sulla, when he threw the standard into the middle of the army of Mithridates, and who, by unanimous acclamation of his victorious soldiers, was proclaimed Augustus on the field of battle.

II. I pass to another subject—Gibbon's well-known description of the uncleanly personal habits of the emperor. "In a satirical performance, which was designed for the public eye, the emperor descants with pleasure, and even with pride, on the length of his nails, and the inky blackness of his hands, and celebrates, with visible complacency, the shaggy and *populous* beard, which he fondly cherished after the example of the philosophers of Greece. Had Julian consulted the simple dictates of reason, the first magistrate of the Romans would have scorned the affectation of Diogenes, as well as that of Darius."

Here I must observe that, in using the *Misopogon* as historical evidence, extreme care must be taken not to confound satire with invective. Through the entire course of this most extraordinary composition, Julian is constantly passing from one to the other, without the slightest warning; and very strange blunders have been made from not bearing this fact steadily in mind.

Premising this, I proceed to examine Gibbon's authority for the above-quoted statement. Julian, in the *Misopogon*, pretends, by an ironical description of his own manners and customs, and even of his personal appearance, to justify the excessive hatred and contempt with which the inhabitants of Antioch regarded him. Describing his satire as an ode in prose (*ῥῶμα πεζῷ λέξει*), he admits that it contains abundant and great abuse, "not, by Jupiter, of others,"

but of the poet-author himself. For, in truth, to write panegyrics or lampoons on oneself, no law forbids; but in my case, were I ever so anxious to praise myself, I could find no materials, though for censure the materials are legion. And, to begin with my face. Nature not having made it particularly attractive, I have, as a sort of sulky revenge, let this long beard grow." Now comes a sentence so objectionable that Gibbon declines translating it—an instance of squeamishness on his part, which, in view of some hundred passages in his great work, may perhaps be regarded as superfluous:—"Ταῦτά τοι διαθέοντων ἀνέχουμαι τῶν φθειρῶν, ὥσπερ ἐν λόχμῃ τῶν θηρίων." Inelegant, no doubt; but the question is, are we to receive this, with Gibbon, as a literal historical description, or, considering the nature of the work in which it occurs, should we not rather regard it as an ironical exaggeration? If we read the remainder of the passage, we shall not find it easy to adopt a literal meaning. Julian is writing half angrily, half in a bantering style—"I can't eat voraciously, for fear I should swallow some of the hair of my beard. You say it ought to be twisted into ropes. Take it, by all means—only take great heed to your delicate and unworked hands, lest the rough and coarse hair should do them a mischief." He goes on—"And not content with this long beard, my head is also in a squalid condition." Contrast this with an expression which occurs in the description by Ammianus of Julian's personal appearance—"capillis, tanquam pexisset, mollibus"—which surely implies that he paid particular attention to his hair. On the whole, I think it is plain that the emperor does not *really* pride himself on a "preserve of wild beasts;" possibly it might have been less hazardous to come into personal contact with the Apostate than with some who died in the odour of sanctity. It is true that, in the well-known fable in the seventh Oration, Jupiter says of Julian—"ὑπὸ καπνοῦ, ῥύπου τε ἀνα-

πέπλησται, καὶ λιγνύος, but Helios delivers him from all this.

As a specimen of the mistakes which may arise from assuming ironical statements in the Misopogon to be literal, I may notice a curious assertion made by Dr. Alphons Mücke in his excellent work, *Flavius Claudius Julianus*. He tells us distinctly that Julian always regarded with aversion and abhorrence his old tutor, Mardonius [a man for whom he really seems to have cherished a sincere affection]—"Julian, der über Mardonius immer nur mit Abscheu und Widerwillen spricht." Mücke's authority for this charge is a long passage in the Misopogon, in which Julian, ironically justifying himself from the accusation of unsocial manners, observes, "It's not my fault; all comes of that evil old man (Mardonius) who had the charge of my education. This imbecile old creature persuaded me, in my youthful simplicity, that if I were to follow the precepts of certain ridiculous parties, called Socrates, and Plato, and Aristotle, and should prefer a virtuous life to one of sensual indulgence, it would be all the better for me." There is a good deal more to the same purport, but which I need not quote, as I do not suppose anyone would maintain that *here* Julian is speaking seriously. And yet Dr. Mücke, from a hasty glance at a word or two, assumes the opprobrious epithets applied to Mardonius as *bond fide*, and hence infers that neither Julian, nor his mother before him, could have derived much benefit from his instruction.

III. One remarkable feature in the character of Julian was his austere chastity. Of this the explicit testimonies in the books of Ammianus are numerous; but the significant silence of the Christian writers on this subject may be regarded as of far greater weight than any amount of positive assertion. Had it been possible to bring to light any failings of the Apostate in this respect, S. Gregory Nazianzen was not the man to cover them over with a bushel. In

a later age, an attempt was made to cast doubts upon the continence of Julian, in consequence of a curious expression which occurs in two of his letters—he speaks of a certain Antiochus as “*τροφεύς τῶν ἑμαυτοῦ παιδίων*.” Now, as it is well known that Julian had no legitimate offspring, it has been hence inferred that he was the parent of an illegitimate family. The comments of the Abbé de la Bleterie on these letters are eminently worthy of our notice. He acquits Julian of the charge of immorality; and even goes so far as to censure the great ecclesiastical historian, de Tillemont, for his reluctance to admit any good qualities in an unbeliever. “In general,” he says, “M. de Tillemont appears slightly vexed when he finds any good quality in a pagan. He does not conceal the facts, but evidently would be better pleased if he did not find them. But he need not be so scrupulous about admitting historical facts; such purely human virtues being occasionally bestowed, but only for the damnation of the recipients.” Here we have the key to the abbé’s usually fair treatment of Julian. Orthodox, but horrible. As for the expression in question, I doubt not that Julian is speaking in a bantering manner, not of any real children, but of his books. In both letters this *τροφεύς* is mentioned in connexion with a literary commission; and the jest was plainly familiar to the philosophical friends to whom they are addressed.

Now, how does the panegyrist Gibbon deal with this commendable trait in Julian’s character? Here is all the credit he gives him—“He practised, without effort, and almost without merit, the habitual qualities of temperance and sobriety.” Thus reducing poor Julian, who was indebted for his self-conquest to the “*parcimonia ciborum et somni, quibus domi forisque tenacius utebatur*,” to the level of the imbecile Edward the Confessor.

IV. But a far more striking instance of self-control on the part of the Apostate may be found in the history of

the Misopogon—self-control perhaps unparalleled, but for which only scanty praise has been meted out by Gibbon. It may be worth while to recapitulate, very briefly, the circumstances under which this extraordinary satire was written. Julian, on his way to his death, was spending the winter of A. D. 362-3 in Antioch, the “*apex pulcher Orientis*.” Notorious as were the Greek cities of Syria for their luxury and voluptuousness, Antioch seems to have headed them all—“*pernoctantium luminum claritudo diem solet imitari fulgorem*.” But luxury was not the only characteristic of the Antiochians. Extraordinary insolence to the authorities was another disagreeable feature in their constitution. They were nearly all Christians in Julian’s time, but Christianity had by no means improved them. There is no dispute as to their general evil life; on this point Pagan and Christian writers are quite in harmony. Julian and Chrysostom present the same picture of Antiochian society. The mere fact that the new emperor was received on his arrival with great demonstrations of popular joy is sufficient to show that the populace were by no means zealous in their Christianity. The re-establishment of paganism in the metropolis was perfectly well known, and it is not easy to believe that a multitude of earnest believers would have accorded such an enthusiastic reception to an apostate prince. Still it is not unlikely that Julian may have been much encouraged by the manifest delight with which the Christian mob appears to have hailed his arrival. He may have supposed, and perhaps not without a show of reason, that the crowds who were shouting his praises were disgusted with their Christianity, and would be delighted to afford him assistance in his projected restoration of the old worship.

If so, he was sadly mistaken. The indifference of the Antiochians to the faith of Christ was not in any way connected with zeal for Jupiter and Apollo. Bacchus and

Venus—their ritual unpurified by philosophical allegory—were amply sufficient as objects for the devotion of the great mass of the population of that debauched and riotous city. Julian's popularity did not last long. From all we can learn concerning his mode of life in Antioch, it would appear that he devoted his whole energy to the restoration of the worship of the gods, the administration of justice, the study of philosophy, and the superintendence of his army. With none of these pursuits had his idle and dissolute subjects the slightest sympathy; and when they found that their emperor, to use his own expression, cared less about their theatrical performances than the croaking of frogs in the marshes, they began to regard him with contempt, which quickly degenerated into hatred. This cut Julian to the quick. He was, no doubt, over sensitive to popular applause; and this is the precise feature in his character which, in my judgment, renders his conduct in the matter of the Misopogon without a parallel in history.

A blunder in Political Economy brought matters to a crisis. When we consider the present state of that so-called science, it will appear unreasonable to blame a fourth century legislator for any amount of ignorance of its fundamental principles. Suffice it to say, that a scarcity of corn being felt in Antioch,—partly occasioned by a defective harvest in Syria, partly by the presence of the army,—Julian foolishly imagined that the evil could be remedied by an arbitrary fixing of a low price on corn. His edict was indeed nothing more than the re-enactment, on a small scale, of Diocletian's law, which attempted to fix a maximum price on *all* commodities. But his well-intentioned though ill-judged measure was of course a failure. The vendors disappeared from the markets. The poor were not benefited. Julian had infuriated the two powerful classes of landowners and merchants, and had not conciliated the proletariat.

The town burst out with every sort of lampoon. Julian was a Cercops, a man-monkey, a dwarf mimicking a giant, a goaty-beard, a bull-burner. Every conceivable epithet of abuse was hurled at his head, with all the amiable frankness which characterised the Antiochians. This was the treatment of a man whose constitution was intensely sensitive; who was eager for popular applause, and perhaps morbidly susceptible to slights and insults of all kinds—"vulgi plausibus laetus, laudum etiam ex minimis rebus intemperans adpetitor." He had done what he could to conciliate them; mixing freely with the citizens, administering justice with gentleness—"asking after their children," says Libanius, just as if Julian had been out on an electioneering canvass. We must remember too, that, wanting but one word from their general, stood the two fierce legions—Petulantes and Celtæ—in arms; their mouths watering at the sight of the rich city of Antioch; no doubt mentally revolving the Roman equivalent for the sentiment "Mein Gott! what a city for to sack!" If we bear all this in mind, we shall, I think, find it hard to parallel in history the self-control exhibited by the "heaven-de-tested power," as Evagrius calls Julian, avenging himself, not by fierce military execution, but by sitting down in his palace, trembling with passion, and writing the *Misopogon*. All history tells us that nothing is so furiously resented by men in absolute power as ridicule and contemptuous treatment. See, *e.g.*, the conduct of a Christian prince of unimpeachable orthodoxy,—William, conqueror of England. A personal insult to *him* was never expiated by libations of ink. No, by the Splendour of God! he dealt with all such in a sharper way:

WULFNOTH.

Hast thou never heard

His savagery at Alençon,—the town

Hung out raw hides along their walls, and cried

'Work for the tanner.'

HAROLD.

That had anger'd me
Had I been William.

WULFNOTH.

Nay, but he had prisoners.
He tore their eyes out, sliced their hands away,
And flung them streaming o'er the battlements
Upon the heads of those who walk'd within.

No poetical exaggeration this. It was all done by a man who at the Church's bidding would have slain with tortures anyone who mis-stated a formula concerning the nature of the Trinity; but with whose conduct on this occasion, that of the poor benighted apostate, scribbling with his inky fingers at his Misopogon, as a relief to the angry feelings of his exasperated soul, contrasts as light with darkness.

It has been said indeed, and, as a general rule, with truth, that, at the epoch of Julian's reign, Christianity might be combated, but was too strong to be persecuted. But Julian's position at Antioch was exceptional. We know, from Ammianus, that his old legions, the Petulantes and Celtæ, who had sworn, with their swords held across their throats, that they would follow him to death, were with him. They had, moreover, been fed to such an extent on the victims slain in sacrifice, and so corrupted with greediness of drink (*potusque aviditate corrupti*) that their usual mode of returning from the temples to their quarters was on the shoulders of passers by (*humeris impositi transeuntium*), and, as we might expect from this mode of life, their audacity (*confidentia*) had increased beyond all bounds. To have loosed this dangerous crowd of debauched and godless soldiers on the impudent and unarmed mob of Antioch, would have required very little persuasion from their enraged commander; and what the result of this would have been is plain enough. Libanius, in his oration *De Ira Juliani*, points out the ease with

which the emperor could destroy even the greatest city ἐν
 ἡμέρας σμίκρῳ μέρει.

Accordingly, I must say that Julian on this occasion is worthy of higher commendation than Gibbon has thought fit to bestow upon him, when he describes the Misopogon as "a singular monument of the resentment, the wit, the humanity, and the indiscretion of Julian."

V. But Gibbon's steady pursuit of a reputation for religious impartiality, by abusing Julian, is still more conspicuous in the sneer which, whenever possible, accompanies his relation of the meritorious deeds of the unfortunate apostate. We are told that "a tender regard for the peace and happiness of his subjects, was the ruling principle which directed, *or seemed to direct*, the administration of Julian." He "*affected to assume*, with more pleasure, the character of a magistrate, than that of a general." In the history of the great rebellion of the legions in Gaul, occasioned by gross breach of faith to the auxiliaries on the part of Constantius, and during which Julian appears to have remained in his allegiance to his unworthy cousin as long as it was possible, we can produce a whole crop of malicious insinuations. When the soldiers were setting out for the Alps,—an expedition from which none expected to return to their own country alive,—Julian, to alleviate their sufferings, granted a sufficient number of post-wagons to transport their wives and families; and thus, the panegyrist observes, "increased, by the most laudable arts, his own popularity, and the discontent of the exiled troops." Julian's refusal of the crown, till it was thrust on him, on pain of death if he persisted in his refusal, is readily explained—"Prudence as well as loyalty inculcated the propriety of resisting their treasonable designs, and of preparing, for his oppressed virtue, the excuse of violence." We learn moreover that "the new emperor, overwhelmed with real *or affected* grief, retired into the most secret re-

cesses of his apartment," after the diadem was placed on his head. "The grief of Julian could proceed only from his innocence; but this innocence must appear extremely doubtful in the eyes of those who have learned to suspect the motives and the professions of princes He solemnly declares, in the presence of Jupiter, of the Sun, of Mars, of Minerva, and of all the other deities, that till the close of the evening which preceded his elevation, he was utterly ignorant of the designs of the soldiers; and it may seem ungenerous to distrust the honour of a hero, and the truth of a philosopher." And Gibbon *is* ungenerous enough to distrust both—for "whenever the spirit of fanaticism, at once so credulous and so crafty, has insinuated itself into a noble mind, it insensibly corrodes the vital principles of virtue and veracity." Constantius has the effrontery to charge Julian with ingratitude to the man who had preserved him when left a helpless orphan; Julian indignantly asks—"Does the assassin of my family reproach me that I was left an orphan?" Here Gibbon calmly observes that Julian "justified his cause by indulging his passions." At the risk of his own life, the new made emperor saved Nebridius, the courageous servant of Constantius, from the swords of the infuriated soldiers; but, because he refused to touch this faithful Abdiel's hand, Gibbon is careful to point out that he treated the fallen prefect "with less respect than was perhaps due to the virtue of an enemy." Julian attended the funeral of Constantius with every mark of respect; which marks of respect "may be interpreted as a selfish tribute to the birth and dignity of his imperial kinsman;" and his subjects "applauded the real or affected humanity of their sovereign."

All this is far indeed from the work of a panegyrist. "Die Schmähungen eines Cyrillus, Gregor von Nazianz, Sozomenus sind weniger widerlich, und mit einem viel geringeren Grade von Selbstüberwindung zu lesen, als die

Vorwürfe Gibbon's." There is much truth in these words of Dr. Mücke.

VI. The consideration of Gibbon's handling of Julian's treatment of the Christians would lead me into discussions far transcending the limits of this Paper. I shall confine myself to pointing out one strange misrepresentation, by the historian, of a passage in the very curious "Fragmentum Epistolæ," addressed by the emperor, in his capacity of Pontifex Maximus, to some unknown subordinate priest. Gibbon tells us that Julian "insinuates that the Christians, under pretence of charity, inveigled children from their religion and parents, conveyed them on shipboard, and devoted those victims to a life of poverty or servitude in a remote country. Had the charge been proved, it was his duty not to complain, but to punish." Here are the words of Julian:—"ὥσπερ οἱ τὰ παῖδια διὰ τοῦ πλακοῦντος ἐξαπατῶντες τῷ καὶ δις καὶ τρις προέσθαι πείθουσιν ἀκολουθεῖν ἑαυτοῖς, εἰθ', ὅταν ἀποστήσωσι πόρρω τῶν οἰκείων, ἐμβάλλοντες εἰς ναῦν ἀπέδοντο, καὶ γέγονεν εἰς ἅπαντα τὸν ἐξῆς βίον πικρὸν τὸ δόξαν πρὸς ὀλίγον γλυκύ, τὸν αὐτὸν καὶ αὐτοὶ [the Galileans] τρόπον ἀρξάμενοι διὰ τῆς λεγομένης παρ' αὐτοῖς ἀγάπης καὶ ὑποδοχῆς καὶ διακονίας τραπεζῶν· ἔστι γὰρ ὥσπερ τὸ ἔργον οὕτω δὲ καὶ τοῦνομα παρ' αὐτοῖς πολὺ· πλείστους ἐνήγαγον εἰς τὴν ἀθεότητα," [Christianity]. This is surely no more than an *illustration* of the practice of the proselytizing Christians, and there is not the slightest "insinuation" that they were actually kidnappers of young children. So here we have the apostate charged with bearing false witness against his neighbour, when, in reality, Gibbon is bearing false witness against him.

I think I have now said enough to make out that the author of *The Decline and Fall* has not shown Julian much favour. He sneers at him incessantly as a thorough-going hypocrite; damns him with faint praise; and, when possible, ascribes low and unworthy motives to his actions.

He gives far too much weight to the unsupported statements of such men as Gregory, Sozomenos, and Theodoret—men from whom it would be about as reasonable to expect a just estimate of Julian, as it would be to expect an impartial biographical sketch of Mr. Gladstone from an Irish disestablished curate. Certainly, some independence of mind is an essential qualification in the man who ventures to mete out justice to a worthy apostate; and hence may be explained the very common portrait of Julian as a mixture of fiend and idiot. But harsh, and even unfair, treatment of his great predecessor was not to have been expected from Gibbon. “Who would not weep if Atticus were he?”

J. W. BARLOW.

GREEK GEOMETRY FROM THALES TO EUCLID.¹

IN studying the development of Greek Science, two periods must be carefully distinguished.

The founders of Greek philosophy—Thales and Pythagoras—were also the founders of Greek Science, and from the time of Thales to that of Euclid and the foundation of the Museum of Alexandria, the development of science was, for the most part, the work of the Greek *philosophers*. With the foundation of the School of Alexandria, a second period commences; and henceforth, until the end of the scientific evolution of Greece, the cultivation of science was separated from that of philosophy, and pursued for its own sake.

In this Paper I propose to give some account of the progress of geometry during the first of these periods, and

¹ It has been frequently observed, and is indeed generally admitted, that the present century is characterized by the importance which is attached to historical researches, and by a widely-diffused taste for the philosophy of history.

In Mathematics, we have evidence of these prevailing views and tastes in two distinct ways:—

1° The publication of many recent works on the history of Mathematics, *e. g.*—

Arneth, A., *Die Geschichte der reinen Mathematik*, Stuttgart, 1852;

* Bretschneider, C. A., *Die Geometrie*

und die Geometer Vor Euklides, Leipzig, 1870; Suter, H., *Geschichte der Mathematischen Wissenschaften* (1st Part), Zurich, 1873; * Hankel, H., *Zur Geschichte der Mathematik in Alterthum und Mittel-alter*, Leipzig, 1874 (a posthumous work); * Hoefer, F., *Histoire des Mathématiques*, Paris, 1874. (This forms the fifth volume by M. Hoefer on the history of the sciences, all being parts of the *Histoire Universelle*, published under the direction of M. Duruy.) In studying the subject of this Paper, I have made use of the works marked thus *. Though the work of M. Hoefer is too metaphysical

also to notice briefly the chief organs of its development.

For authorities on the early history of geometry we are dependent on scattered notices in ancient writers, many of which have been taken from a work which has unfortunately been lost—the *History of Geometry* by Eudemus of Rhodes, one of the principal pupils of Aristotle. A summary of the history of geometry during the whole period of which I am about to treat has been preserved by Proclus, who most probably derived it from the work of Eudemus. I give it here at length, because I shall frequently have occasion to refer to it in the following pages.

After attributing the origin of geometry to the Egyptians, who, according to the old story, were obliged to in-

and is not free from inadvertencies and even errors, yet I have derived advantage from the part which concerns Pythagoras and his ideas. Hankel's book contains some fragments of a great work on the History of Mathematics, which was interrupted by the death of the author. The part treating of the mathematics of the Greeks during the first period—from Thales to the foundation of the School of Alexandria—is fortunately complete. This is an excellent work, and is in many parts distinguished by its depth and originality.

The monograph of M. Bretschneider is most valuable, and is greatly in advance of all that preceded it on the origin of geometry amongst the Greeks. He has collected with great care, and has set out in the original, the fragments relating to it, which are scattered in ancient writers; I have derived much aid from these citations.

2° New editions of ancient Mathematical works, some of which had become extremely scarce, *e. g.*—

Theodosii *Sphaericorum libri Tres*, Nizze, Berlin, 1852; Nicomachi Geraseni *Introductiones Arithmeticae*, lib. II., Hoche, Lipsiae, 1866 (Teubner); Boetii *De Inst. Arithm., &c.*, ed. G. Friedlein, Lipsiae, 1867 (Teubner); Procli Diadochi in *primum Euclidis Elementorum librum commentarii*, ex recog. G. Friedlein, Lipsiae, 1873 (Teubner); Heronis Alexandrini *Geometricorum et Stereometricorum Reliquiae e libris manuscriptis*, edidit F. Hultsch, Berolini, 1864; Pappi Alexandrini *Collectiones quae supersunt e libris manuscriptis Latina interpretatione et commentariis* instruxit F. Hultsch, vol. I, Berolini, 1876: vol. II, *ib.*, 1877.

Occasional portions only of the Greek text of Pappus had been published at various times (see De Morgan in Dr. W. Smith's *Dictionary of Biography*). An Oxford edition, uniform with the great editions of Euclid, Apollonius, and Archimedes, published in the last century, has been long looked for.

vent it in order to restore the landmarks which had been destroyed by the inundation of the Nile, and observing that it is by no means strange that the invention of the sciences should have originated in practical needs, and that, further, the transition from sensual perception to reflection, and from that to knowledge, is to be expected, Proclus goes on to say that Thales, having visited Egypt, first brought this knowledge into Greece; that he discovered many things himself, and communicated the beginnings of many to his successors, some of which he attempted in a more abstract manner (*καθολικώτερον*), and some in a more intuitional or sensible manner (*αἰσθητικώτερον*). After him, Ameristus [or Mamercus], brother of the poet Stesichorus, is mentioned as celebrated for his zeal in the study of geometry. Then Pythagoras changed it into the form of a liberal science, regarding its principles in a purely abstract manner, and investigated its theorems from the immaterial and intellectual point of view (*ἀύλως καὶ νοερῶς*); he also discovered the theory of incommensurable quantities (*τῶν ἀλόγων πραγματείαν*), and the construction of the mundane figures [the regular solids]. After him, Anaxagoras of Clazomenae contributed much to geometry, as also did Oenopides of Chios, who was somewhat junior to Anaxagoras. After these, Hippocrates of Chios, who found the quadrature of the lunule, and Theodorus of Cyrene became famous in geometry. Of those mentioned above, Hippocrates is the first writer of elements. Plato, who was posterior to these, contributed to the progress of geometry, and of the other mathematical sciences, through his study of these subjects, and through the mathematical matter introduced in his writings. Amongst his contemporaries were Leodamas of Thasos, Archytas of Tarentum, and Theaetetus of Athens; by all of whom theorems were added or placed on a more scientific basis. To Leodamas succeeded Neocleides, and his pupil was Leon, who added much to what had been

done before. Leon also composed elements, which, both in regard to the number and the value of the propositions proved, are put together more carefully; he also invented that part of the solution of a problem called its determination (*διορισμός*)—a test for determining when the problem is possible and when impossible. Eudoxus of Cnidus, a little younger than Leon and a companion of Plato's pupils, in the first place increased the number of general theorems, added three proportions to the three already existing, and also developed further the things begun by Plato concerning the section,² making use, for the purpose, of the analytical method (*ταῖς ἀναλύσεσιν*). Amyclas of Heraclea, one of Plato's companions, and Menaechmus, a pupil of Eudoxus and also an associate of Plato, and his brother, Deinostratus, made the whole of geometry more perfect. Theudius of Magnesia appears to have been distinguished in mathematics, as well as in other branches of philosophy, for he made an excellent arrangement of the elements, and generalized many particular propositions. Athenaeus of Cyzicus [or Cyzicinus of Athens] about the same time became famous in other mathematical studies, but especially in geometry. All these frequented the Academy, and made their researches in common. Hermotimus of Colophon developed further what had been done by Eudoxus and Theaetetus, discovered many elementary theorems, and wrote something on loci. Philip-pus Mendaus [Medmaeus], a pupil of Plato, and drawn by him to mathematical studies, made researches under Plato's direction, and occupied himself with whatever he thought

² Does this mean the cutting of a straight line in extreme and mean ratio, "*sectio aurea*"? or is the reference to the invention of the conic sections? Most probably the former. In *Euclid's Elements*, Lib., xiii., the terms *analysis*

and *synthesis* are first used and defined by him in connection with theorems relating to the cutting of a line in extreme and mean ratio. See Bretschneider, *Die Geometrie vor Euklides*, p. 168.

would advance the Platonic philosophy. Thus far those who have written on the history of geometry bring the development of the science.³

Proclus goes on to say, Euclid was not much younger than these; he collected the elements, arranged much of what Eudoxus had discovered, and completed much that had been commenced by Theaetetus; further, he substituted incontrovertible proofs for the lax demonstrations of his predecessors. He lived in the times of the first Ptolemy, by whom, it is said, he was asked whether there was a shorter way to the knowledge of geometry than by his Elements, to which he replied that there was no *royal road* to geometry. Euclid then was younger than the disciples of Plato, but elder than Eratosthenes and Archimedes—who were contemporaries—the latter of whom mentions him. He was of the Platonic sect, and familiar with its philosophy, whence also he proposed to himself the construction of the so-called Platonic bodies [the regular solids] as the final aim of his systematization of the Elements.⁴

I.

The first name, then, which meets us in the history of Greek mathematics is that of Thales of Miletus (640–546 B. C.). He lived at the time when his native city, and Ionia in general, were in a flourishing condition, and when an active trade was carried on with Egypt. Thales himself was engaged in trade, and is said to have resided in Egypt, and, on his return to Miletus in his old age, to have brought with him from that country the knowledge of geometry and

³ From these words we infer that the *History of Geometry* by Eudemus is most probably referred to, inasmuch as he lived at the time here indicated, and his history is elsewhere mentioned by Proclus.—Proclus, ed. G. Friedlein,

pp. 299, 333, 352, and 379.

⁴ Procli Diadochi in *primum Euclid. elementorum librum commentarii*. E recognitione G. Friedlein. Lipsiae, 187. pp. 64–68.

astronomy. To the knowledge thus introduced he added the capital creation of the geometry of lines, which was essentially abstract in its character. The only geometry known to the Egyptian priests was that of surfaces, together with a sketch of that of solids, a geometry consisting of some simple quadratures and elementary cubatures, which they had obtained empirically; Thales, on the other hand, introduced *abstract* geometry, the object of which is to establish precise *relations* between the different parts of a figure, so that some of them could be found by means of others in a manner strictly rigorous. This was a phenomenon quite new in the world, and due, in fact, to the abstract spirit of the Greeks. In connection with the new impulse given to geometry, there arose with Thales, moreover, scientific astronomy, also an abstract science, and undoubtedly a Greek creation. The astronomy of the Greeks differs from that of the Orientals in this respect, that the astronomy of the latter, which is altogether concrete and empirical, consisted merely in determining the duration of some periods, or in indicating, by means of a mechanical process, the motions of the sun and planets, whilst the astronomy of the Greeks aimed at the discovery of the geometric laws of the motions of the heavenly bodies.⁵

⁵ The importance, for the present research, of bearing in mind this abstract character of Greek science consists in this, that it furnishes a clue by means of which we can, in many cases, recognise theorems of purely Greek growth, and distinguish them from those of eastern extraction. The neglect of this consideration has led some recent writers on the early history of geometry greatly to exaggerate the obligations of the Greeks to the Orientals; whilst others have attributed to

the Greeks the discovery of truths which were known to the Egyptians. See, in relation to the distinction between abstract and concrete science, and its bearing on the history of Greek Mathematics, amongst many passages in the works of Auguste Comte, *Système de Politique Positive*, vol. III., ch. iv., p. 297, and *seq.*, vol. I., ch. i., pp. 424-437; and see, also, *Les Grands Types de l'Humanité*, par P. Laffitte, vol. II., Leçon 15ième, p. 280, and *seq.*—*Appréciation de la Science Antique*.

The following notices of the geometrical work of Thales have been preserved :—

(a). He is reported to have first demonstrated that the circle was bisected by its diameter ;⁶

(b). He is said first to have stated the theorem that the angles at the base of every isosceles triangle are equal, “*or*, as in archaic fashion he phrased it, *like* (ὁμοίαι);”⁷

(c). Eudemus attributes to him the theorem that when two straight lines cut each other, the vertically opposite angles are equal ;⁸

(d). Pamphila⁹ relates that he, having learned geometry from the Egyptians, was the first person to describe a right-angled triangle in a circle ; others, however, of whom Apollodorus (ὁ λογιστικός) is one, say the same of Pythagoras ;¹⁰

(e). He never had any teacher except during the time when he went to Egypt and associated with the priests. Hieronymus also says that he measured the pyramids, making an observation on our shadows when they are of the same length as ourselves, and applying it to the pyramids.¹¹ To the same effect Pliny—“*Mensuram altitudinis earum omniumque similium deprehendere invenit Thales Milesius, umbram metiendo, qua hora par esse corpori solet ;*”¹²

(This is told in a different manner by Plutarch. Niloxenus is introduced as conversing with Thales concerning Amasis, King of Egypt.—“*Although he [Amasis] admired you [Thales] for other things, yet he particularly liked the*

⁶ Proclus, ed. Friedlein, p. 157.

⁷ *Ibid.*, p. 250.

⁸ *Ibid.*, p. 299.

⁹ Pamphila was a female historian who lived at the time of Nero ; an Epidaurian according to Suidas, an Egyptian according to Photius.

¹⁰ Diogenes Laertius, I., c. 1, n. 3,

ed. C. G. Cobet, p. 6.

¹¹ ὁ δὲ Ἱερώνυμος καὶ ἐκμετρήσας φησὶ αὐτὸν τὰς πυραμίδας ἐκ τῆς σκιᾶς παρτηρήσαντα ὅτε ἡμῶν ἰσομεγέθεις εἰσίν. Diog. Laert., I., c. 1, n. 6., ed. Cobet, p. 6.

¹² Plin. *Hist. Nat.*, xxxvi. 17.

manner by which you measured the height of the pyramid without any trouble or instrument ; for, by merely placing a staff at the extremity of the shadow which the pyramid casts, you formed two triangles by the contact of the sunbeams, and showed that the height of the pyramid was to the length of the staff in the same ratio as their respective shadows").¹³

(*f*). Proclus tells us that Thales measured the distance of vessels from the shore by a geometrical process, and that Eudemus, in his history of geometry, refers the theorem *Eucl.* i. 26 to Thales, for he says that it is necessary to use this theorem in determining the distance of ships at sea according to the method employed by Thales in this investigation ;¹⁴

(*g*). Proclus, or rather Eudemus, tells us in the passage quoted above *in extenso* that Thales brought the knowledge of geometry to Greece, and added many things, attempting some in a more abstract manner, and some in a more intuitional or sensible manner.¹⁵

Let us now examine what inferences as to the geometrical knowledge of Thales can be drawn from the preceding notices.

First inference.—Thales must have known the theorem that the sum of the three angles of a triangle is equal to two right angles.

Pamphila, in (*d*), refers to the discovery of the property of a circle that all triangles described on a diameter as base with their vertices on the circumference have their vertical angles right.¹⁶

¹³ Plut. *Sept. Sap. Conviv.* 2, vol. iii., p. 174, ed. Didot.

¹⁴ Proclus, ed. Friedlein, p. 352.

¹⁵ *Ibid.*, p. 65.

¹⁶ This is unquestionably the discovery referred to. The manner in

which it has been stated by Diogenes Laertius shows that he did not distinguish between a problem and a theorem ; and further, that he was ignorant of geometry. To this effect Proclus—
“When, therefore, anyone proposes to

Assuming, then, that this theorem was known to Thales, he must have known that the sum of the three angles of any right-angled triangle is equal to two right angles, for, if the vertex of any of these right-angled triangles be connected with the centre of the circle, the right-angled triangle will be resolved into two isosceles triangles, and since the angles at the base of an isosceles triangle are equal—a theorem attributed to Thales (δ)—it follows that the sum of the angles at the base of the right-angled triangle is equal to the vertical angle, and that therefore the sum of the three angles of the right-angled triangle is equal to two right angles. Further, since any triangle can be resolved into two right-angled triangles, it follows immediately that the sum of the three angles of any triangle is equal to two right angles. If, then, we accept the evidence of Pamphila as satisfactory, we are forced to the conclusion that Thales must have known this theorem. No doubt the knowledge of this theorem (*Euclid* i., 32) is required in the proof given in the elements of Euclid of the property of the circle (iii., 31), the discovery of which is attributed to Thales by Pamphila, and some writers have inferred hence that Thales must have known the theorem (i., 32).¹⁷ Although I agree with this conclusion, for the reasons given

inscribe an equilateral triangle in a circle, he proposes a problem: for it is possible to inscribe one that is not equilateral. But when anyone asserts that the angles at the base of an isosceles triangle are equal, he must affirm that he proposes a theorem: for it is not possible that the angles at the base of an isosceles triangle should be unequal to each other. On which account if anyone, stating it as a problem, should say that he wishes to inscribe a right angle in a semicircle, he must be considered as ignorant of geometry, since

every angle in a semicircle is necessarily a right one."—Taylor's *Proclus*, vol. I., p. 110. *Procl.* ed. Friedlein, pp. 79, 80.

Sir G. C. Lewis has subjected himself to the same criticism when he says—'According to Pamphila, he first solved the problem of inscribing a right-angled triangle in a circle.'—G. Cornwell Lewis, *Historical Survey of the Astronomy of the Ancients*, p. 83.

¹⁷ So F. A. Finger, *De Primordiis Geometriae apud Graecos*, p. 20, Heidelberg, 1831.

above, yet I consider the inference founded on the demonstration given by Euclid to be inadmissible, for we are informed by Proclus, on the authority of Eudemus, that the theorem (*Euclid* i., 32) was first proved in a general way by the Pythagoreans, and their proof, which does not differ substantially from that given by Euclid, has been preserved by Proclus.¹⁸ Further, Geminus states that the ancient geometers observed the equality to two right angles in each species of triangle separately, first in equilateral, then in isosceles, and lastly in scalene triangles,¹⁹ and it is plain that the geometers older than the Pythagoreans can be no other than Thales and his successors in the Ionic school.

If I may be permitted to offer a conjecture, in conformity with the notice of Geminus, as to the manner in which the theorem was arrived at in the different species of triangles, I would suggest that Thales had been led by the concrete geometry of the Egyptians to contemplate floors covered with tiles in the form of equilateral triangles or regular hexagons,²⁰ and had observed that six equilateral triangles could be placed round a common vertex, from which he saw that six such angles made up four right angles, and that consequently the sum of the three angles of an equilateral triangle is equal to two right angles (*c*). The observation of a floor covered with square tiles would lead to a similar conclusion with respect to the isosceles right-angled triangle.²¹ Further, if a perpen-

¹⁸ Proclus, ed. Friedlein, p. 379.

¹⁹ Apollonii *Conica*, ed. Hallejus, p. 9, Oxon. 1710.

²⁰ Floors or walls covered with tiles of various colours were common in Egypt. See Wilkinson's "*Ancient Egyptians*," vol. ii., pp. 287 and 292.

²¹ Although the theorem that "only three kinds of regular polygons—the equilateral triangle, the square and the hexagon—can be placed about a point

so as to fill a space," is attributed by Proclus to Pythagoras or his school (*ἐστὶ τὸ θεώρημα τοῦτο Πυθαγόρειον*. Proclus, ed. Friedlein, p. 305), yet it is difficult to conceive that the Egyptians—who erected the pyramids—had not a practical knowledge of the fact that tiles of the forms above mentioned could be placed so as to form a continuous plane surface.

pendicular be drawn from a vertex of an equilateral triangle on the opposite side,²² the triangle is divided into three right-angled triangles, which are in every respect equal to each other, hence the sum of the three angles of each of these right-angled triangles is easily seen to be two right angles. If now we suppose that Thales was led to examine whether the property, which he had observed in two distinct kinds of right-angled triangles, held generally of all right-angled triangles, it seems to me that, by completing the rectangle and drawing the second diagonal, he could easily see that the diagonals are equal, that they bisect each other, and that the vertical angle of the right-angled triangle is equal to the sum of the base angles. Further, if he constructed several right-angled triangles on the same hypotenuse he could see that their vertices are all equally distant from the middle point of their common hypotenuse, and therefore lie on the circumference of a circle described on that line as diameter, which is the theorem in question. It may be noticed that this remarkable property of the circle, with which, in fact, abstract geometry was inaugurated, struck the imagination of Dante :—

“ O se del mezzo cerchio far si puote
Triangoli sì, ch'un retto non avesse.”

Par. c. xiii. 101

Second inference.—The conception of geometrical science is due to Thales.

We are informed by Eudemus (*f*) that Thales held that a triangle is determined if its base and base angles are given; further, we have seen that Thales knew

²² Though we are informed by Proclus (ed. Friedlein, p. 283), that Oenopides of Chios first solved (*εἰρησεν*) this problem, yet Thales, and indeed the Egyptians, who were furnished with

the square, could not be ignorant of a mechanical solution. Observe that we are expressly told by Proclus that Thales attempted some things in an intuitive or sensible manner.

ase is given, and the base angles not given separately their sum known to be a right angle, then there e described an unlimited number of triangles ig the conditions of the question, and that their all lie on the circumference of a circle described base as diameter. Hence it is manifest that the nt conception of *geometrical loci*, which is attributed tucla, and after him by Chasles and other writers History of Mathematics, to the School of Plato,²³ n formed by Thales.

d inference.—Thales discovered the theorem that s of equiangular triangles are proportional.

knowledge of this theorem is distinctly attributed s by Plutarch in a passage quoted above (e). On r hand, Hieronymus of Rhodes, a pupil of Aris- cording to the testimony of Diogenes Laertius,²⁴ t Thales measured the height of the pyramids by g when bodies cast shadows of their own length, he same effect Pliny in the passage quoted above (e). neider thinks that Plutarch has spun out the story Hieronymus, attributing to Thales the knowledge wn times, denies to Thales the knowledge of the in question, and says that there is no trace of any s concerning similarity before Pythagoras.²⁵ He ther, that the Egyptians were altogether ignorant octrine of the similarity of figures, that we do not ngst them any trace of the doctrine of proportion, t Greek writers say that this part of their mathe-

cla, *Histoire des Mathéma-*
ne i., p. 183, Paris, 1758.
verçu *Historique des Métho-*
ndrie, p. 5, Bruxelles, 1837.
he history of geometry be-
copies Montucla, and we
rkable instance of this here,
, after Montucla, calls Plato

“ce chef du *Lycée*.”

²⁴ But we have seen that the account given by Diogenes Laertius of the discovery of Thales mentioned by Pamphila is unintelligible and evinces ignorance of geometry on his part.

²⁵ Bretsch. *Die Geometrie und Geometer vor Euklides*, pp. 45, 46.

mathematical knowledge was derived from the Babylonians or Chaldaeans.²⁶ Bretschneider also endeavours to show that Thales could have obtained the solution of the second practical problem—the determination of the distance of a ship from the shore—by geometrical construction, a method long before known to the Egyptians.²⁷ Now, as Bretschneider denies to the Egyptians and to Thales any knowledge of the doctrine of proportion, it was plainly necessary, on this supposition, that Thales should find a sufficient extent of free and level ground on which to construct a triangle of the same dimensions as that he wished to measure; and even if he could have found such ground, the great length of the sides would have rendered the operations very difficult.²⁸ It is much simpler to accept the testimony of Plutarch, and suppose that the method of superseding such operations by using similar triangles is due to Thales.

If Thales had employed a right-angled triangle,²⁹ he could have solved this problem by the same principle which, we are told by Plutarch, he used in measuring the height of the pyramid, the only difference being that the right-

²⁶ *Ibid*, p. 18.

²⁷ *Ibid*, pp. 43, 44.

²⁸ In reference to this I may quote the following passage from Clairaut, *Elémens de Géométrie*, pp. 34-35. Paris, 1741.

“La méthode qu'on vient de donner pour mesurer les terrains, dans lesquels on ne sauroit tirer de lignes, fait souvent naître de grandes difficultés dans la pratique. On trouve rarement un espace uni et libre, assez grand pour faire des triangles égaux à ceux du terrain dont on cherche la mesure. Et même quand on en trouveroit, la grande longueur des côtés des triangles pourroit rendre les opérations très-difficiles :

abaisser une perpendiculaire sur une ligne du point qui en est éloigné seulement de 500 toises, ce seroit un ouvrage extrêmement pénible, et peut-être impracticable. Il importe donc d'avoir un moyen qui supplée à ces grandes opérations. Ce moyen s'offre comme de lui-même. Il vient, &c.”

²⁹ Observe that the inventions of the square and level are attributed by Pliny (*Nat. Hist.*, vii., 57) to Theodorus of Samos, who was a contemporary of Thales. They were, however, known long before this period to the Egyptians; so that to Theodorus is due at most the honour of having introduced them into Greece.

angled triangle is in one case in a vertical, and in the other in a horizontal plane.

From what has been said²⁹ it is plain that there is a natural connection between the several theorems attributed to Thales, and that the two practical applications which he made of his geometrical knowledge are also connected with each other.

Let us now proceed to consider the importance of the work of Thales :—

I. In a scientific point of view :—

(a). We see, in the first place, that by his two theorems he founded the geometry of lines, which has ever since remained the principal part of geometry.³⁰

Vainly do some recent writers refer these geometrical discoveries of Thales to the Egyptians; in doing so they ignore the distinction between the geometry of lines, which we owe to the genius of the Greeks, and that of areas and volumes—the only geometry known, and that empirically, to the ancient priesthoods. This view is confirmed by an ancient papyrus, that of Rhind,³¹ which is now in the British Museum. It contains a complete applied mathematics, in which the measurement of figures and solids plays the principal part; there are no theorems properly so called; everything is stated in the form of problems, not in general terms but in distinct numbers, *e. g.*—to measure a rectangle the sides of which contain two and ten units of length; to find the surface of a circular area whose diameter is six units; to mark out in a field a right-angled triangle

²⁹ Auguste Comte, *Système de Politique Positive*, vol. iii., p. 297.

³¹ Birch, in Lepsius' *Zeitschrift für Aegyptische Sprache und Alterthumskunde* (year 1868, p. 108). Bretschneider, *Geometrie vor Euklides*, p. 16. F. Hoefer, *Histoire des Ma-*

thematiques, p. 69. Since this Paper was sent to the press, Dr. August Eisenlohr, of Heidelberg, has published this papyrus with a translation and commentary under the title "*Ein Mathematisches Handbuch der alten Ägypter*."

whose sides measure ten and four units; to describe a trapezium whose parallel sides are six and four units, and each of the other sides twenty units. We find also in it indications for the measurement of solids, particularly of pyramids, whole and truncated.

It appears from the above that the Egyptians had made great progress in practical geometry. Of their proficiency and skill in geometrical constructions we have also the direct testimony of the ancients; for example, Democritus says: "No one has ever excelled me in the construction of lines according to certain indications—not even the so-called Egyptian Harpedonaptae."³²

(δ). Thales may, in the second place, be fairly considered to have laid the foundation of Algebra, for his first theorem establishes an equation in the true sense of the word, while the second institutes a proportion.³³

II. In a philosophic point of view:—

We see that in these two theorems of Thales the first type of a *natural law*—*i. e.*, the expression of a fixed dependence between different quantities, or, in another form, the disentanglement of constancy in the midst of variety—has decisively arisen.³⁴

III. Lastly, in a practical point of view:—

Thales furnished the first example of an application of theoretical geometry to practice,³⁵ and laid the foundation of an important branch of the same—the measurement of heights and distances.

I have now pointed out the importance of the geometrical discoveries of Thales, and attempted to appreciate his work. His successors of the Ionic School followed

³² Mullach, *Fragmenta Philosophorum Graecorum*, p. 371, Democritus ap. Clem. Alex. *Strom.* I. p. 357, ed. Potter.

³³ Auguste Comte (*Système de Pol.*

Pos. vol. iii., p. 300).

³⁴ P. Laffitte, *Les Grands Types de l'Humanité*, vol. ii., p. 292.

³⁵ *Ibid.*, p. 294.

him in other lines of thought, and were, for the most part, occupied with physical theories on the nature of the universe—speculations which have their representatives at the present time—and added little or nothing to the development of science, except in astronomy. The further progress of geometry was certainly not due to them.

Without doubt Anaxagoras of Clazomenae, one of the latest representatives of this School, is said to have been occupied during his exile with the problem of the quadrature of the circle, but this was in his old age, and after the works of another School—to which the early progress of geometry was really due—had become the common property of the Hellenic race. I refer to the immortal School of Pythagoras.

II.

About the middle of the sixth century before the Christian era, a great change had taken place: Ionia, no longer free and prosperous, had fallen under the yoke, first of Lydia, then of Persia, and the very name Ionian—the name by which the Greeks were known in the whole East—had become a reproach, and was shunned by their kinsmen on the other side of the Aegean.³⁶ On the other hand, Athens and Sparta had not become pre-eminent; the days of Marathon and Salamis were yet to come. Meanwhile the glory of the Hellenic name was maintained chiefly by the Italic Greeks, who were then in the height of their prosperity, and had recently obtained for their territory the well-earned appellation of *ἡ μεγάλη Ἑλλάς*.³⁷ It should be noted, too, that at this period there was great commercial intercourse between the Hellenic cities of Italy and Asia; and further, that some of them, as Sybaris and Miletus on the one hand, and Tarentum and Cnidus on the other, were

³⁶ Herodotus, i. 143.

i., p. 141, 1844.

³⁷ Polybius, ii., 39; ed. Bekker, vol.

bound by ties of the most intimate character.³⁸ It is not surprising, then, that after the Persian conquest of Ionia, Pythagoras, Xenophanes, and others, left their native country, and, following the current of civilization, removed to Magna Graecia.

As the introduction of geometry into Greece is by common consent attributed to Thales, so all³⁹ are agreed that to Pythagoras of Samos, the second of the great philosophers of Greece, and founder of the Italic School, is due the honour of having raised mathematics to the rank of a science.

The statements of ancient writers concerning this great man are most conflicting, and all that relates to him personally is involved in obscurity; for example, the dates given for his birth vary within the limits of eighty-four years—43rd to 64th Olympiad.⁴⁰ It seems desirable, however, if for no other reason than to fix our ideas, that we should adopt some definite date for the birth of Pythagoras; and there is an additional reason for doing so, inasmuch as some writers, by neglecting this, have become confused, and fallen into inconsistencies in the notices which they have given of his life. Of the various dates which have been assigned for the birth of Pythagoras, the one which seems to me to harmonise best with the records of the most trustworthy writers is that given by Ritter, and adopted by Grote, Brandis, Ueberweg, and Hankel, namely, about 580 B. C. (49th Olymp.) This date would accord with the following statements:—

That Pythagoras had personal relations with Thales, then old, of whom he was regarded by all antiquity as the

³⁸ Herod., vi. 21, and iii. 138.

³⁹ Aristotle, Diogenes Laertius, Proclus, amongst others.

⁴⁰ See G. H. Lewes, *Biographical*

History of Philosophy, Book ii., c. ii., where the various dates given by scholars are cited.

successor, and by whom he was incited to visit Egypt,⁴¹—mother of all the civilization of the West ;

That he left his country being still a young man, and, on this supposition as to the date of his birth, in the early years of the reign of Croesus (560–546 B. C.), when Ionia was still free ;

That he resided in Egypt many years, so that he learned the Egyptian language, and became imbued with the philosophy of the priests of the country ;⁴²

That he probably visited Crete and Tyre, and may have even extended his journeys to Babylon, at that time Chaldaean and free ;

That on his return to Samos, finding his country under the tyranny of Polycrates,⁴³ and Ionia under the dominion of the Persians, he migrated to Italy in the early years of Tarquinius Superbus ;⁴⁴

And that he founded his Brotherhood at Crotona, where for the space of twenty years or more he lived and taught, being held in the highest estimation, and even looked on almost as divine by the population—native as well as Hellenic ; and then, soon after the destruction of Sybaris (510 B. C.), being banished by a democratic party under Cylon, he removed to Metapontum, where he died soon afterwards.

All who have treated of Pythagoras and the Pythagoreans have experienced great difficulties. These difficulties are due partly to the circumstance that the reports of the earlier and most reliable authorities have for the most part been lost, while those which have come down to us are not always consistent with each other. On the other hand, we have pretty full accounts from later writers, especially those

⁴¹ Iamblichus, *de Vita Pyth.*, c. ii., 12.

ap. Porphyry., *de Vita Pyth.*, 9.

⁴² Isocrates is the oldest authority for this, *Busiris*, c. 11.

⁴³ Cicero, *de Rep.* II., 15 ; *Tusc. Disp.*, I., xvi., 38.

⁴⁴ Diog. Laert., viii. 3 ; Aristoxenus,

of the Neo-Pythagorean School; but these notices, which are mixed up with fables, were written with a particular object in view, and are in general highly coloured; they are particularly to be suspected, as Zeller has remarked, because the notices are fuller and more circumstantial the greater the interval from Pythagoras. Some recent authors, therefore, even go to the length of omitting from their account of the Pythagoreans everything which depends solely on the evidence of the Neo-Pythagoreans. In doing so, these authors no doubt effect a simplification, but it seems to me that they are not justified in this proceeding, as the Neo-Pythagoreans had access to ancient and reliable authorities which have unfortunately been lost since.⁴⁵

Though the difficulties to which I refer have been felt chiefly by those who have treated of the Pythagorean *philosophy*, yet we cannot, in the present inquiry, altogether escape from them; for, in the first place, there was, in the whole period of which we treat, an intimate connection between the growth of philosophy and that of science, each re-acting on the other; and, further, this was particularly the case in the School of Pythagoras, owing to the fact, that whilst on the one hand he united the study of geometry with that of arithmetic, on the other he made numbers the base of his philosophical system, as well physical as metaphysical.

It is to be observed, too, that the early Pythagoreans published nothing, and that, moreover, with a noble self-denial, they referred back to their master all their discoveries. Hence, it is not possible to separate what was done by him from what was done by his early disciples, and we

⁴⁵ For example, the *History of Geometry*, by Eudemus of Rhodes, one of the principal pupils of Aristotle, is quoted by Theon of Smyrna, Proclus, Simplicius, and Eutocius, the last two

of whom lived in the reign of Justinian. Eudemus also wrote a *History of Astronomy*. Theophrastus, too, Aristotle's successor, wrote *Histories of Arithmetic, Geometry, and Astronomy*.

are under the necessity, therefore, of treating the work of the early Pythagorean School as a whole.⁴⁶

All agree, as was stated above, that Pythagoras first raised mathematics to the rank of a science, and that we owe to him two new branches—arithmetic and music.

We have the following statements on the subject:—

(a.) In the age of these philosophers [the Eleats and Atomists], and even before them, lived those called Pythagoreans, who first applied themselves to mathematics, a science they improved : and, penetrated with it, they fancied that the principles of mathematics were the principles of all things; ⁴⁷

(b.) Eudemus informs us, in the passage quoted above *in extenso*, that Pythagoras changed geometry into the form of a liberal science, regarding its principles in a purely abstract manner, and investigated his theorems from the immaterial and intellectual point of view; and that he also discovered the theory of irrational qualities, and the construction of the mundane figures [the five regular solids]; ⁴⁸

(c.) It was Pythagoras, also, who carried geometry to perfection, after Moeris ⁴⁹ had first found out the principles of the elements of that science, as Anticlidides tells us in the second book of his *History of Alexander*; and the part

⁴⁶ "Pythagoras and his earliest successors do not appear to have committed any of their doctrines to writing. According to Porphyrius (*de Vita Pyth.* p. 40), Lysis and Archippus collected in written form some of the principal Pythagorean doctrines, which were handed down as heirlooms in their families, under strict injunctions that they should not be made public. But amid the different and inconsistent accounts of the matter, the first publication of the Pythagorean doctrines is pretty uniformly attributed to Philo-

laus."—Smith's *Dictionary*, in *v. Philolaus*. Philolaus was born at Crotona, or Tarentum, and was a contemporary of Socrates and Democritus. See Diog. Laert. in *Vita Pythag.*, viii., i., 15; in *Vita Empedoclis*, viii., ii., 2; and in *Vita Democriti*, ix., vii., 6. See also Iamblichus, *de Vita Pythag.*, c. 18, s. 88.

⁴⁷ Aristot. *Met.*, i., 5, 985, N. 23, ed. Bekker.

⁴⁸ Procl. *Comm.*, ed. Friedlein, p. 65.

⁴⁹ An ancient King of Egypt, who reigned 900 years before Herodotus.

of the science to which Pythagoras applied himself above all others was arithmetic ;⁵⁰

(*d.*) Pythagoras seems to have esteemed arithmetic above everything, and to have advanced it by diverting it from the service of commerce, and likening all things to numbers ;⁵¹

(*e.*) He was the first person who introduced measures and weights among the Greeks, as Aristoxenus the musician informs us ;⁵²

(*f.*) He discovered the numerical relations of the musical scale ;⁵³

(*g.*) The word mathematics originated with the Pythagoreans ;⁵⁴

(*h.*) The Pythagoreans made a four-fold division of mathematical science, attributing one of its parts to the how many, τὸ πῶσον, and the other to the how much, τὸ πηλίκον ; and they assigned to each of these parts a two-fold division. Discrete quantity, or the how many, either subsists by itself, or must be considered with relation to some other ; and continued quantity, or the how much, is either stable or in motion. Hence arithmetic contemplates that discrete quantity which subsists by itself, but music that which is related to another ; and geometry considers continued quantity so far as it is immovable ; but astronomy (τὴν σφαιρικὴν) contemplates continued quantity so far as it is of a self-motive nature ;⁵⁵

(*i.*) Favorinus says that he employed definitions on

⁵⁰ Diog. Laert., viii. 11, ed. Cobet, p. 207.

⁵¹ Aristoxenus, *Fragm.* ap. Stob. *Eclog. Phys.*, i., ii., 6 ; ed. Heeren, vol. i., p. 17.

⁵² Diog. Laert., viii., 13, ed. Cobet, p. 208.

⁵³ τὸν τε κανόνα τὸν ἐκ μιᾶς χορδῆς

εὑρεῖν. Diog. Laert., viii., 11, ed. Cobet, p. 207.

⁵⁴ Procli *Comm.*, Friedlein, p. 45.

⁵⁵ Procli *Comm.*, ed. Friedlein, p. 35. As to the distinction between τὸ πηλίκον, continuous, and τὸ πῶσον, discrete, quantity, see Iambl., in *Λίτ. G. Arithm. introd.* ed. Ten., p. 148.

account of the mathematical subjects to which he applied himself (*ἑροῖς χρῆσασθαι διὰ τῆς μαθηματικῆς ὕλης*).⁵⁶

As to the particular work done by this school in geometry, the following statements have been handed down to us :—

(a.) The Pythagoreans define a point as unity having position (*μονάδα προσλαβοῦσαν θέσιν*);⁵⁷

(b.) They considered a point as analogous to the monad, a line to the duad, a superficies to the triad, and a body to the tetrad;⁵⁸

(c.) The plane around a point is completely filled by six equilateral triangles, four squares, or three regular hexagons: this is a Pythagorean theorem;⁵⁹

(d.) The peripatetic Eudemus ascribes to the Pythagoreans the discovery of the theorem that the interior angles of a triangle are equal to two right angles (*Eucl.* i. 32), and states their method of proving it, which was substantially the same as that of Euclid;⁶⁰

(e.) Proclus informs us in his commentary on Euclid, i., 44, that Eudemus says that the problems concerning the application of areas—in which the term application is not to be taken in its restricted sense (*παραβολή*) in which it is used in this proposition, but also in its wider signification, embracing *ὑπερβολή* and *ἔλλειψις*, in which it is used in the 28th and 29th propositions of the Sixth Book,—are old, and inventions of the Pythagoreans;⁶¹

⁵⁶ Diog. Laert., viii., 25, ed. Cobet, p. 215.

⁵⁷ Procli *Comm.* ed. Friedlein, p. 95.

⁵⁸ *Ibid.*, p. 97.

⁵⁹ *Ibid.*, p. 305.

⁶⁰ *Ibid.*, p. 379.

⁶¹ *Ibid.*, p. 419. The words of Proclus are interesting :—

“ According to Eudemus, the inventions respecting the *application*, *excess*,

and *defect* of areas are ancient, and are due to the Pythagoreans. Moderns borrowing these names transferred them to the so-called conic lines—the parabola, the hyperbola, the ellipse; as the older school in their nomenclature concerning the description of areas *in plano* on a finite right line regarded the terms thus :—

“ An area is said to be *applied* (*παρα*

(*f.*) This is to some extent confirmed by Plutarch, who says that Pythagoras sacrificed an ox on account of the geometrical diagram, as Apollodotus [-rus] says :—

Ἦνίκα Πυθαγόρης τὸ περικλεῖς εὗρετο γράμμα,
Κεῖν' ἐφ' ὅτ' λαμπρὴν ἤγετο βουθυσίην,

either the one relating to the hypotenuse—namely, that the square on it is equal to the sum of the squares on the sides—or that relating to the problem concerning the application of areas (εἴτε πρόβλημα περὶ τοῦ χωρίου τῆς παραβολῆς);⁶²

(*g.*) One of the most elegant (γεωμετρικωτάτοις) theorems, or rather problems, is to construct a figure equal to one and similar to another given figure, for the solution of which also they say that Pythagoras offered a sacrifice: and indeed it is finer and more elegant than the theorem which shows that the square on the hypotenuse is equal to the sum of the squares on the sides;⁶³

(*h.*) Eudemus, in the passage already quoted from Proclus, says Pythagoras discovered the construction of the regular solids;⁶⁴

βάλλειν) to a given right line when an area equal in content to some given one is described thereon; but when the base of the area is greater than the given line, then the area is said to be in *excess* (ὑπερβάλλειν); but when the base is less, so that some part of the given line lies without the described area, then the area is said to be in *defect* (ἐλλείπειν). Euclid uses in this way, in his Sixth Book, the terms *excess* and *defect*. . . . The term *application* (παραβάλλειν), which we owe to the Pythagoreans, has this signification."

⁶² Plutarch, *non posse suaviter vivi sec. Epicurum*, c. xi.; Plut., *Opera*, ed. Didot, vol. iv., p. 1338. Some authors,

rendering περὶ τοῦ χωρίου τῆς παραβολῆς "concerning the area of the parabola," have ascribed to Pythagoras the quadrature of the parabola—which was in fact one of the great discoveries of Archimedes; and this, though Archimedes himself tells us that no one before him had considered the question; and though further he gives in his letter to Dositheus the history of his discovery, which, as is well known, was first obtained from mechanical considerations, and then by geometrical reasonings.

⁶³ Plutarch, *Symp.*, viii., *Quaestio* 2, c. 4. Plut. *Opera*, ed. Didot, vol. iv., p. 877.

⁶⁴ Procl. *Comm.*, ed. Friedlein, p. 65.

(2.) But particularly as to Hippasus, who was a Pythagorean, they say that he perished in the sea on account of his impiety, inasmuch as he boasted that he first divulged the knowledge of the sphere with the twelve pentagons [the ordinate dodecahedron inscribed in the sphere]: Hippasus assumed the glory of the discovery to himself, whereas everything belonged to Him—for thus they designate Pythagoras, and do not call him by name;⁶⁵

(j.) The triple interwoven triangle or Pentagram—star-shaped regular pentagon—was used as a symbol or sign of recognition by the Pythagoreans, and was called by them Health (*ὑγίεια*);⁶⁶

(k.) The discovery of the law of the three squares (*Eucl.* I., 47), commonly called the *Theorem of Pythagoras*, is attributed to him by—amongst others—Vitruvius,⁶⁷ Dio- genes Laertius,⁶⁸ Proclus,⁶⁹ and Plutarch (*f*). Plutarch, however, attributes to the Egyptians the knowledge of this theorem in the particular case where the sides are 3, 4, and 5;⁷⁰

(l.) One of the methods of finding right-angled triangles whose sides can be expressed in numbers—that

⁶⁵ Iambl., *de Vit. Pyth.*, c. 18, s. 88.

⁶⁶ Scholiast on Aristophanes, *Nub.* 611; also Lucian, *pro Lapsu in Salut.*, s. 5. That the Pythagoreans used such symbols we learn from Iamblichus (*de Vit. Pyth.*, c. 33, ss. 237 and 238). This figure is referred to Pythagoras himself, and in the middle ages was called *Pythagorae figura*. It is said to have obtained its special name from his having written the letters ν , γ , ι , θ (= $\epsilon\iota$), α , at its prominent vertices. We learn from Kepler (*Opera Omnia*, ed. Frisch, vol. v., p. 122) that even so late as Pa-

racelsus it was regarded by him as the symbol of health. See Chasles, *Histoire de Géométrie*, pp. 477 et seqq.

⁶⁷ *De Arch.*, ix., Praef. 5, 6, and 7.

⁶⁸ Where the same couplet from Apollodorus as that in (*f*) is found, except that *κλεινὴν ἡγάγε* occurs in place of *λαμπρὴν ἡγενο*. Diog. Laert., viii., 11, p. 207, ed. Cobet.

⁶⁹ Procli *Comm.*, p. 426, ed. Friedlein.

⁷⁰ *De Is. et Osir.*, c. 56. Plut. *Op.*, vol. iii., p. 457, Didot.

setting out from the odd numbers—is attributed to Pythagoras;⁷¹

(*m.*) The discovery of irrational quantities is ascribed to Pythagoras by Eudemus in the passage quoted above from Proclus;⁷²

(*n.*) The three proportions—arithmetical, geometrical, and harmonical, were known to Pythagoras;⁷³

(*o.*) Formerly, in the time of Pythagoras and the mathematicians under him, there were three means only—the arithmetical, the geometrical, and the third in order which was known by the name *ὑπεναντία*, but which Archytas and Hippasus designated the harmonical, since it appeared to include the ratios concerning harmony and melody (*μετακληθείσα δτι τοὺς κατὰ τὸ ἀρμολογούμενον καὶ ἑμμελὲς ἐφαίνετο λόγους περιέχουσα*);⁷⁴

(*p.*) With reference to the means corresponding to these proportions, Iamblichus says:⁷⁵—We must now speak of the most perfect proportion, consisting of four terms, and properly called the musical, for it clearly contains the musical ratios of harmonical symphonies. It is said to be an invention of the Babylonians, and to have been brought first into Greece by Pythagoras;⁷⁶

⁷¹ Procli *Comm.*, ed. Friedlein, p. 428; Heronis Alex., *Geom. et Ster. Rel.*, ed. F. Hultsch, pp. 56, 146.

⁷² Procli *Comm.*, ed. Friedlein, p. 65.

⁷³ Nicom. *G. Introd. Ar.* c. xxii., ed. R. Hoche, p. 122.

⁷⁴ Iamblichus in *Nicomachi Arithmetica* a S. Tennulio, p. 141.

⁷⁵ *Ibid.*, p. 168.

⁷⁶ *Ibid.*, p. 168. As an example of this proportion, Nicomachus gives the numbers 6, 8, 9, 12, the harmonical and arithmetical means between two numbers forming a geometrical proportion

with the numbers themselves. (Nicom. *Instit. Arithm.* ed. Ast. p. 153, and *Animad.*, p. 329; see, also, Iambl., in *Nicom. Arithm.* ed. Ten., pp. 172 et seq.)

Hankel, commenting on this passage of Iamblichus, says: "What we are to do with the report, that this proportion was known to the Babylonians, and only brought into Greece by Pythagoras, must be left to the judgment of the reader."—*Geschichte der Mathematik*, p. 105. In another part of his book,, however, after refer-

(g.) The doctrine of arithmetical progressions is attributed to Pythagoras;⁷⁷

(r.) It would appear that he had considered the special case of *triangular* numbers. Thus Lucian:—ΠΥΘ. Εἰρ' ἐπὶ ὑποποῖσιν ἀριθμεῖν. ΑΓ. Οἶδα καὶ νῦν ἀριθμεῖν. ΠΥΘ. Πῶς ἀριθμεῖς; ΑΓ. Ἐν, δύο, τρία, τέτταρα. ΠΥΘ. Ὁρᾷς; ἃ σὺ δοκίμεις τέτταρα, ταῦτα δέκα ἐστὶ καὶ τρίγωνον ἐντελὲς καὶ ἡμέτερον ὄραον.⁷⁸

(s.) Another of his doctrines was, that of all solid figures the sphere was the most beautiful; and of all plane figures, the circle.⁷⁹

(t.) Also Iamblichus, in his commentary on the Categories of Aristotle, says that Aristotle may perhaps not have squared the circle; but that the Pythagoreans had done so, as is evident, he adds, from the demonstrations of the Pythagorean Sextos who had got by tradition the manner of proof.⁸⁰

On examining the purely geometrical work of Pythagoras and his early disciples, we observe that it is much concerned with the geometry of areas, and we are indeed struck with its Egyptian character. This appears in the theorem (c) concerning the filling up a plane by regular polygons, as already noted; in the construction of the regular solids (h)—for some of them are found in the Egyptian architecture; in the problems concerning the application of areas (e); and lastly, in the law of the three

ring to two authentic documents of the Babylonians which have come down to us, he says: "We cannot, therefore, doubt that the Babylonians occupied themselves with such progressions [arithmetical and geometrical]; and a Greek notice that they knew proportions, nay, even invented the so-called perfect or musical proportion, gains thereby in value."—*Ibid.*, p. 67.

⁷⁷ *Theologumena Arithmetica*, p. 153, ed. F. Ast, Lipsiae, 1817.

⁷⁸ Lucian, *Βίων πρᾶσις*, 4, vol. i., p. 317, ed. C. Jacobitz.

⁷⁹ Καὶ τῶν σχημάτων τὸ κάλλιστον σφαῖραν εἶναι τῶν στερεῶν κύκλον, Diog. Laert., *in Vita Pyth.*, viii., 19.

⁸⁰ Simplicius, *Comment.*, &c., ap. Bretsch., *Die Geometrie vor Euklides*, p. 108.

squares (k), coupled with the rule given by Pythagoras for the construction of right-angled triangles in numbers (l).

According to Plutarch, the Egyptians knew that a triangle whose sides consist of 3, 4, and 5 parts, must be right-angled. "The Egyptians may perhaps have imagined the nature of the universe like the most beautiful triangle, as also Plato appears to have made use of it in his work on the State, where he sketches the picture of matrimony. That triangle contains one of the perpendiculars of 3, the base of 4, and the hypotenuse of 5 parts, the square of which is equal to those of the containing sides. The perpendicular may be regarded as the male, the base as the female, the hypotenuse as the offspring of both, and thus Osiris as the originating principle ($\acute{\alpha}\rho\chi\eta$), Isis as the receptive principle ($\acute{\upsilon}\pi\omicron\delta\omicron\chi\acute{\eta}$), and Horus as the product ($\acute{\alpha}\pi\omicron\tau\acute{\epsilon}\lambda\epsilon\sigma\mu\alpha$)."^{80a}

This passage is remarkable, and seems to indicate the way in which the knowledge of the useful geometrical fact enunciated in it may have been arrived at by the Egyptians. The contemplation of a draught-board, or of a floor covered with square tiles, or of a wall ruled with squares,⁸¹ would at once show that the square constructed on the diagonal of a square is equal to the sum of the squares constructed on the sides—each containing four of the right-angled isosceles triangles into which one of the squares is divided by its diagonal.

Although this observation would not serve them for practical uses, on account of the impossibility of presenting it arithmetically, yet it must have shown the possibility of

^{80a} Plutarch, *De Is. et Osir.* c. 56, vol. iii., p. 457, ed. Didot.

⁸¹ It was the custom of the Egyptians, where a subject was to be drawn, to rule the walls of the building accu-

rately with squares before the figures were introduced. See Wilkinson's *Ancient Egyptians*, vol. ii., pp. 265, 267.

constructing a square which would be the sum of two squares, and encouraged them to attempt the solution of the problem numerically. Now, the Egyptians, with whom speculations concerning generation were in vogue, could scarcely fail to have perceived, from the observation of a chequered board, that the element in the successive formation of squares is the gnomon (*γνώμων*),⁸² or common carpenter's square, which was known to them.⁸³ It remained then for them only to examine whether some particular gnomon might not be metamorphosed into a square, and, therefore, *vice versa*. The solution would then be easy, being furnished at once from the contemplation of a floor or board composed of squares.

Each gnomon consists of an odd number of squares, and the successive gnomons correspond to the successive

⁸² *Γνώμων* means that by which anything is known, or criterion; its oldest concrete signification seems to be the carpenter's square (*norma*), by which a right angle is known. Hence, it came to denote a perpendicular, of which, indeed, it was the archaic name, as we learn from Proclus on Euclid, i., 12 :—Τοῦτο τὸ πρόβλημα πρῶτον Οἰνοπίδης ἐζήτησεν χρησίμων αὐτὸ πρὸς ἀστρολογίαν οἰόμενος· ὀνομάζει δὲ τὴν κάθετον ἀρχαϊκῶς κατὰ γνώμονα, διότι καὶ ὁ γνώμων πρὸς ὀρθὰς ἐστὶ τῷ ὀρίζοντι (Procli *Comm.*, ed. Friedlein, p. 283). Gnomon is also an instrument for measuring altitudes, by means of which the meridian can be found; it denotes, further, the index or style of a sundial, the shadow of which points out the hours.

In geometry it means the square or rectangle about the diagonal of a square or rectangle, together with the two

complements, on account of the resemblance of the figure to a carpenter's square; and then, more generally, the similar figure with regard to any parallelogram, as defined by Euclid, ii., Def. 2. Again, in a still more general signification, it means the figure which, being added to any figure, preserves the original form. See Hero, *Definitions* (59).

When gnomons are added successively in this manner to a square monad, the first gnomon may be regarded as that consisting of three square monads, and is indeed the constituent of a simple Greek fret; the second, of five square monads, &c.; hence we have the *gnomonic* numbers, which were also looked on as male, or generating.

⁸³ Wilkinson's *Ancient Egyptians*, vol. ii., p. 111.

odd numbers,⁸⁴ and include, therefore, all odd squares. Suppose, now, two squares are given, one consisting of 16 and the other of 9 unit squares, and that it is proposed to form another square out of them. It is plain that the square consisting of 9 unit squares can take the form of the fourth gnomon, which, being placed round the former square, will generate a new square containing 25 unit squares. Similarly, it may have been observed that the 12th gnomon, consisting of 25 unit squares, could be transformed into a square, each of whose sides contain 5 units, and thus it may have been seen conversely that the latter square, by taking the gnomonic, or generating, form with respect to the square on 12 units as base, would produce the square of 13 units, and so on.

This, then, is my attempt to interpret what Plutarch has told us concerning Isis, Osiris, and Horus, bearing in mind that the odd, or gnomonic, numbers were regarded by Pythagoras as male, or generating.⁸⁵

⁸⁴ It may be observed here that we first count with *counters*, as is indicated by the Greek *ψηφίσαι* and the Latin *calculare*. The counters might be equal squares, as well as any other like objects. There is an indication that the odd numbers were first regarded in this manner in the name *gnomonic* numbers, which the Pythagoreans applied to them, and that term was used in the same signification by Aristotle, and by subsequent writers, even up to Kepler. See Arist. *Phys.*, lib. iii., ed. Bekker, vol. i. p. 203; Stob., *Eclog.*, § ab Heeren, vol. i., p. 24, and note; Kepleri *Opera Omnia*, ed. Ch. Frisch, vol. viii., *Mathematica*, pp. 164 et seq.

⁸⁵ This seems to me to throw light on some of the oppositions which are found

in the table of principles attributed by Aristotle to certain Pythagoreans (*Metaph.*, i., 5, 986 a, ed. Bekker).

The odd—or *gnomonic*—numbers are finite; the even, infinite. Odd numbers were regarded also as male, or generating. Further, by the addition of successive gnomons—consisting, as we have seen, each of an odd number of units—to the original unit square or monad, the square form is preserved. On the other hand, if we start from the simplest oblong (*τρεπόμενες*), consisting of two unit squares, or monads, in juxtaposition, and place about it, after the manner of a gnomon—and gnomon, as we have seen, was used in this more extended sense also at a later period—4 unit squares, and

It is another matter to see that the triangle formed by 3, 4, and 5 units is right-angled, and this I think the

then in succession in like manner 6, 8, . . . unit squares, the oblong form *ἑτερο-μήκες* will be preserved. The elements, then, which generate a square are odd, while those of which the oblong is made up are even. The limited, the odd, the male, and the square, occur on one side of the table: while the unlimited, the even, the female, and the oblong, are met with on the other side.

The correctness of this view is confirmed by the following passage preserved by Stobaeus:—"Ἐτι δὲ τῇ μονάδι τῶν ἐφεξῆς περισσῶν γνωμόνων περιτιθεμένων, ὁ γινόμενος ἀεὶ τετράγωνός ἐστι. τῶν δὲ ἀρτίων ὁμοίως περιτιθέμενων, ἑτερομήκεις καὶ ἄνισοι πάντες ἀποβαίνουσιν. ἴσον δὲ ἰσάκεις οὐδέις.

"Explicanda haec sunt ex antiqua Pythagoricorum terminologia. Γνώμονες nempe de quibus hic loquitur auctor, vocabantur apud eos omnes numeri impares, *Joh. Philop. ad Aristot. Phys.*, l. iii., p. 131: Καὶ οἱ ἀριθμητικοὶ δὲ γνώμονας καλοῦσι πάντας τοὺς περιττοὺς ἀριθμούς. Causam adjicit Simplicius ad eundem locum, Γνώμονας δὲ ἐκάλουν τοὺς περιττοὺς οἱ Πυθαγόρειοι διότι προστιθέμενοι τοῖς τετραγώνοις, τὸ αὐτὸ σχῆμα φυλάττουσι, ὅσπερ καὶ οἱ ἐν γεωμετρίᾳ γνώμονες. Quae nostro loco leguntur jam satis clara erunt. Vult nempe auctor, monade addita ad primum gnomonem, ad sequentes autem summam, quam proxime antecedentes numeri efficiunt, semper prodire numeros quadratos, v. c. positus gnomonibus 3, 5, 7, 9 primum $1 + 3 = 2^2$, tunc porro $1 + 3$ (i. e. 4) $+ 5 = 3^2$, $9 + 7 = 4^2$, $16 + 9 = 5^2$, et sic porro, cf. *Tiedem.*

Geist der Speculat. Philos., pp. 107, 108. Reliqua expedita sunt." Stob. *Eclog.* ab Heeren, lib. i., p. 24 and note.

The passage of Aristotle referred to is—σημεῖον δ' εἶναι τοῦτου τὸ συμβαῖνον ἐπὶ τῶν ἀριθμῶν. περιτιθεμένων γὰρ τῶν γνωμόνων περὶ τὸ ἐν καὶ χωρὶς ὅτῃ μὲν ἄλλο ἀεὶ γίγνεται τὸ εἶδος. *Phys.*, iii., 4, p. 203^a, 14.

Compare, ἀλλ' ἔστι τινα αὐξανόμενα ἃ οὐκ ἀλλοιοῦνται, ὅλον τὸ τετράγωνον γνώμονος περιτεθέντος ἤδηται μὲν, ἀλ- λουότερον δὲ οὐδὲν γαγένηται. *Cat.* 14, 15^a, 30, *Arist.*, ed. Bekker.

Hankel gives a different explanation of the opposition between the square and oblong—

"When the Pythagoreans discovered the theory of the Irrational, and recognised its importance, it must, as will be at once admitted, appear most striking that the oppositions, which present themselves so naturally, of Rational and Irrational have no place in their table. Should they not be contained under the image of square and rectangle, which, in the extraction of the square root, have led precisely to those ideas?" *Geschichte der Mathematik*, p. 110, note.

Hankel also says—"Upon what the comparison of the odd with the limited may have been based, and whether upon the theory of the gnomons, can scarcely be made out now." *Ibid.* p. 109, note.

May not the gnomon be looked on as *framing*, as it were, or limiting the squares?

Egyptians may have first arrived at by an induction founded on direct measurement, the opportunity for which was furnished to them by their pavements, or chequered plane surfaces.

The method given above for the formation of the square constructed on 5 units as the sum of those constructed on 4 units and on 3 units, and of that constructed on 13 units as the sum of those constructed on 12 units and 5 units, required only to be generalized in order to enable Pythagoras to arrive at his rule for finding right-angled triangles, which we are told sets out from the odd numbers.

The two rules of Pythagoras and of Plato are given by Proclus:—"But there are delivered certain methods of finding triangles of this kind [*sc.*, right-angled triangles whose sides can be expressed by numbers], one of which they refer to Plato, but the other to Pythagoras, as originating from odd numbers. For Pythagoras places a given odd number as the lesser of the sides about the right angle, and when he has taken the square constructed on it, and diminished it by unity, he places half the remainder as the greater of the sides about the right angle; and when he has added unity to this, he gets the hypotenuse. Thus, for example, when he has taken 3, and has formed from it a square number, and from this number 9 has taken unity, he takes the half of 8, that is 4, and to this again he adds unity, and makes 5; and thus obtains a right-angled triangle, having one of its sides of 3, the other of 4, and the hypotenuse of 5 units. But the Platonic method originates from even numbers. For when he has taken a given even number, he places it as one of the sides about the right angle, and when he has divided this into half, and squared the half, by adding unity to this square he gets the hypotenuse, but by subtracting unity from the square he forms the remaining side about the right angle. Thus, for example, taking 4, and squaring its half, 2, and thus getting

subtracting 1 he gets 3, and by adding 1 he gets he obtains the same triangle as by the former." ⁸⁶ It should be observed, however, that this is not rily the case; for example, we may obtain by the of Plato a triangle whose sides are 8, 15, and 17 which cannot be got by the Pythagorean method.

n^{th} square together with the n^{th} gnomon is the square; if the n^{th} gnomon contains m^2 unit squares; an odd number, we have $2n + 1 = m^2$, $\therefore n = \frac{m^2 - 1}{2}$;

the rule of Pythagoras. Similarly the sum of two ive gnomons contains an even number of unit , and may therefore consist of m^2 unit squares, m is an even number; we have then $(2n - 1) + (2n n^2$, or $n = \left(\frac{m}{2}\right)^2$: hence the rule ascribed to Plato by

s.⁸⁷ This passage of Proclus, which is correctly ined by Hoefer,⁸⁸ was understood by Kepler,⁸⁹ who, was familiar with this work of Proclus, and often it in his *Harmonia Mundi*.

us now examine how Pythagoras proved the the- f the three squares. Though he could have disco- t as a consequence of the theorem concerning the tionality of the sides of equiangular triangles, attri- above to Thales, yet there is no indication whatever of ring arrived at it in that deductive manner. On the

li *Comm.*, ed. Friedlein, p. ro, *Geom.*, ed. Hultsch, pp.

rule is ascribed to Architas t, Archytas of Tarentum] by *Geom.*, ed. Friedlein, p. 408. ier, *Histoire des Math.*, p. 112. leri *Opera Omnia*, ed. Frisch, , pp. 163 et seq. It may rved that this method is

capable of further extension, *e. g.*: the sum of 9 (an odd square number) successive gnomons may contain an odd number (say 49×9) of square units; hence we obtain a right-angled triangle in numbers, whose hypotenuse exceeds one side by 9 units—the three sides being 20, 21, and 29. Plato's method may be extended in like manner.

other hand the proof given in the Elements of Euclid clearly points to such an origin, for it depends on the theorem that the square on a side of a right-angled triangle is equal to the rectangle under the hypotenuse and its adjacent segment made by the perpendicular on it from the right angle—a theorem which follows at once from the similarity of each of the partial triangles, into which the original right-angled triangle is broken up by the perpendicular, with the whole. That the proof in the Elements is not the way in which the theorem was discovered is indeed stated directly by Proclus, who says:—

“If we attend to those who wish to investigate antiquity, we shall find them referring the present theorem to Pythagoras, . . . For my own part, I admire those who first investigated the truth of this theorem: but I admire still more the author of the Elements, because he has not only secured it by evident demonstration, but because he reduced it into a more general theorem in his sixth book by strict reasoning [Euclid, vi., 31].”⁹⁰

The simplest and most natural way of arriving at the theorem is the following, as suggested by Bretschneider⁹¹:—

A square can be dissected into the sum of two squares and two equal rectangles, as in Euclid, ii., 4; these two rectangles can, by drawing their diagonals, be decomposed into four equal right-angled triangles, the sum of the sides of each being the side of the square: again, these four right-angled triangles can be placed so that a vertex of each shall be in one of the corners of the square in such a way that a greater and less side are in continuation. The original square is thus dissected into the four triangles at

⁹⁰ Procli *Comm.* ed. Friedlein, p. 426.

Camerer, *Euclidis Element.*, vol. i., § 444, and references given there.

⁹¹ Bretsch., *Die Geometrie vor Eu-
klides*, p. 82. This proof is old: see

before and the figure within, which is the square on the hypotenuse. This square then must be equal to the sum of the squares on the sides of the right-angled triangle. Hankel, in quoting this proof from Bretschneider, says that it may be objected that it bears by no means a specifically Greek colouring, but reminds us of the Indian method. This hypothesis as to the oriental origin of the theorem seems to me to be well founded. I would, however, attribute the discovery to the Egyptians, inasmuch as the theorem concerns the geometry of areas, and as the method used is that of the dissection of figures, for which the Egyptians were famous, as we have already seen. Moreover, the theorem concerning the areas connected with two lines and their sum (Euclid, ii., 4), which admits also of arithmetical interpretation, was certainly within their reach. The gnomon by which any square exceeds another breaks up naturally into a square and two equal rectangles.

I think also that the Egyptians knew that the difference between the squares on two lines is equal to the rectangle under their sum and difference—though they would not have stated it in that abstract manner. The two squares may be placed with a common vertex and adjacent sides coinciding in direction, so that their difference is a gnomon. This gnomon can, on account of the equality of the two complements,⁸⁷ be transformed into a rectangle which can be constructed by producing the side of the greater square so that it shall be equal to itself, and then we have the figure of Euclid, ii., 5, or to the side of the lesser square, in which case we have the figure of Euclid, ii., 6. Indeed I have little hesitation in attributing to the Egyptians the contents

⁸⁷ This theorem (Euclid, i. 43) Bretschneider says was called the "theorem of the gnomon." I do not know of any authority for this statement. If the theorem were so called, the word

gnomon was not used in it either as defined by Euclid (ii., *Def.* 2), or in the more general signification in Hero (*Def.* 58).

of the first ten propositions of the second book of Euclid. In the demonstrations of propositions 5, 6, 7, and 8, use is made of the gnomon, and propositions 9 and 10 also can be proved similarly without the aid of Euclid, i., 47.

It is well known that the Pythagoreans were much occupied with the construction of regular polygons and solids which in their cosmology played an essential part as the fundamental forms of the elements of the universe.*

We can trace the origin of these mathematical speculations in the theorem (c) that "the plane around a point is completely filled by six equilateral triangles or four squares, or three regular hexagons," a theorem attributed to the Pythagoreans, but which must have been known as a fact to the Egyptians. Plato also makes the Pythagorean Timaeus explain—"Each straight-lined figure consists of triangles, but all triangles can be dissected into rectangular ones which are either isosceles or scalene. Among the latter the most beautiful is that out of the doubling of which an equilateral arises, or in which the square of the greater perpendicular is three times that of the smaller, or in which the smaller perpendicular is half the hypotenuse. But two or four right-angled isosceles triangles, properly put together, form the square; two or six of the most beautiful scalene right-angled triangles form the equilateral triangle; and out of these two figures arise the solids which correspond with the four elements of the real world, the tetrahedron, octahedron, icosahedron, and the cube."†

This dissection of figures into right-angled triangles may be fairly referred to Pythagoras, and indeed may have been derived by him from the Egyptians.

* Hankel says it cannot be ascertained with precision how far the Pythagoreans had penetrated into this theory, namely, whether the construction of the regular pentagon and ordi-

nate dodecahedron was known to them. Hankel, *Geschichte der Mathematik*, p. 95, note.

† Plato, *Tim.*, c. 20, s. 107.

construction of the regular solids is distinctly
 1 to Pythagoras himself by Eudemus, in the passage
 h he briefly states the principal services of Pytha-
 o geometry. Of the five regular solids, three—the
 iron, the cube, and the octahedron—were certainly
 to the Egyptians, and are to be found in their archi-

There remain, then, the icosahedron and the
 nedron. Let us now examine what is required for
 struction of these two solids.

he formation of the tetrahedron, three, and in that
 octahedron, four, equal equilateral triangles had
 aced with a common vertex and adjacent sides co-
 t, and it was known too that if six such triangles
 laced round a common vertex with their adjacent
 incident, they would lie in a plane, and that, there-
 solid could be formed in that manner from them.
 ined then to try whether five such equilateral tri-
 could be placed at a common vertex in like man-
 n trial it would be found that they could be so
 and that their bases would form a regular penta-
 [The existence of a regular pentagon would thus be

It was also known from the formation of the cube
 ree squares could be placed in a similar way with a
 n vertex, and that, further, if three equal and regu-
 agons were placed round a point as common vertex
 l adjacent sides coincident, they would form a plane.
 ined then only to try whether three equal regular
 ons could be placed with a common vertex, and in
 ar way; this on trial would be found possible, and
 lead to the construction of the regular dodecahedron,
 was the regular solid last arrived at.⁹⁰

see then that the construction of the regular penta-
 required for the formation of each of these two

four elements had been repre- the dodecahedron was then taken sym-
 7 the four other regular solids; bolically for the universe.

regular solids, and that therefore it must have been a discovery of Pythagoras. We have now to examine what knowledge of geometry was required for the solution of this problem.

If any vertex of a regular pentagon be connected with the two remote ones, an isosceles triangle will be formed having each of the base angles double the vertical angle. The construction of the regular pentagon depends, therefore, on the description of such a triangle (Euclid, iv., 10). Now, if either base angle of such a triangle be bisected, the isosceles triangle will be decomposed into two triangles, which are evidently also both isosceles. It is also evident that the one of which the base of the proposed is a side is equiangular with it. From a comparison of the sides of these two triangles it will appear at once by the second theorem, attributed above to Thales, that the problem is reduced to cutting a straight line so that one segment shall be a mean proportional between the whole line and the other segment (Euclid, vi., 30), or so that the rectangle under the whole line and one part shall be equal to the square on the other part (Euclid, ii., 11). To effect this, let us suppose the square on the greater segment to be constructed on one side of the line, and the rectangle under the whole line and the lesser segment on the other side. It is evident that by adding to both the rectangle under the whole line and the greater segment, the problem is reduced to the following:—To produce a given straight line so that the rectangle under the whole line thus produced and the part produced shall be equal to the square on the given line, or, in the language of the ancients, to apply to a given straight line a rectangle which shall be equal to a given area—in this case the square on the given line—and which shall be *excessive* by a square. Now it is to be observed that the problem is solved in this manner by Euclid (vi., 30, 1st method), and that we learn from

Eudemus that the problems concerning the *application* of areas and their *excess* and *defect* are old, and inventions of the Pythagoreans (*e*).⁹¹

The statements, then, of Iamblichus concerning Hip-
pasus (*i*)—that he divulged the sphere with the twelve
pentagons; and of Lucian and the scholiast on Aristo-
phanes (*j*)—that the pentagram was used as a symbol of
recognition amongst the Pythagoreans, become of greater
importance. We learn too from Iamblichus that the Py-
thagoreans made use of signs for that purpose.⁹²

Further, the discovery of irrational magnitudes is
ascribed to Pythagoras in the same passage of Eude-

⁹¹ It may be objected that this reason-
ing presupposes a knowledge, on the
part of Pythagoras, of the method of
geometrical analysis, which was in-
vented by Plato more than a century
later.

While admitting that it contains the
germ of that method, I reply in the
first place, that this manner of reason-
ing was not only natural and sponta-
neous, but that in fact in the solution
of problems there was no other way of
proceeding. And, to anticipate a little,
we shall see, secondly, that the oldest
fragment of Greek geometry extant—
that namely by Hippocrates of Chios—
contains traces of an analytical method,
and that, moreover, Proclus ascribes
to Hippocrates, who, it will appear,
was taught by the Pythagoreans the
method of reduction (*ἀπαγωγή*), a sys-
tematization, as it seems to me, of the
manner of reasoning that was sponta-
neous with Pythagoras. Proclus de-
fines *ἀπαγωγή* to be “a transition from
one problem or theorem to another,
which being known or determined, the
thing proposed is also plain. For ex-
ample: when the duplication of the
cube is investigated, geometers reduce

the question to another to which this
is consequent, *i. e.* the finding of two
mean proportionals, and afterwards
they inquire how between two given
straight lines two mean proportionals
may be found. But Hippocrates of
Chios is reported to have been the first
inventor of geometrical reduction (*ἀπα-
γωγή*): who also squared the lunule,
and made many other discoveries in
geometry, and who was excelled by no
geometer in his powers of construc-
tion.”—Proclus, ed. Friedlein, p. 212.
Lastly, we shall find that the passages
in Diogenes Laertius and Proclus,
which are relied on in support of the
statement that Plato invented this
method, prove nothing more than that
Plato communicated it to Leodamas
of Thasos. For my part, I am con-
vinced that the gradual elaboration
of this famous method—by which ma-
thematics rose above the elements—is
due to the Pythagorean philosophers
from the founder to Theodorus of
Cyrene and Archytas of Tarentum,
who were Plato's masters in mathema-
tics.

⁹² Iambl. *de Pyth. Vita*, cxxxiii.,
p. 77, ed. Didot.

mus (m), and this discovery has been ever regarded as one of the greatest of antiquity. It is commonly assumed that Pythagoras was led to this theory from the consideration of the isosceles right-angled triangle. It seems to me, however, more probable that the discovery of incommensurable magnitudes was rather owing to the problem—To cut a line in extreme and mean ratio. From the solution of this problem it follows at once that, if on the greater segment of a line so cut a part be taken equal to the less, the greater segment, regarded as a new line, will be cut in a similar manner; and this process can be continued without end. On the other hand, if a similar method be adopted in the case of any two lines which are capable of numerical representation, the process would end. Hence would arise the distinction between commensurable and incommensurable quantities.

A reference to Euclid, x., 2, will show that the method above is the one used to prove that two magnitudes are incommensurable. And in Euclid, x., 3, it will be seen that the greatest common measure of two commensurable magnitudes is found by this process of continued subtraction.

It seems probable that Pythagoras, to whom is attributed one of the rules for representing the sides of right-angled triangles in numbers, tried to find the sides of an isosceles right-angled triangle numerically, and that, failing in the attempt, he suspected that the hypotenuse and a side had no common measure. He may have demonstrated the incommensurability of the side of a square and its diagonal. The nature of the old proof—which consisted of a *reductio ad absurdum*, showing that if the diagonal be commensurable with the side, it would follow that the same number would be odd and even⁹³—makes it more probable, however, that this was accomplished by his successors.

⁹³ Aristoteles, *Analyt. Prior.*, i., c. 23, 41, a, 26, and c. 44, 50, a, 37, ed. Becker.

Euclid has preserved this proof, x., 117. Hankel thinks he did so probably

for its historical interest only, since irrationality follows self-evidently from x., 9; and x., 117, is merely an appendix.—Hankel, *Geschichte der Math.* p. 102, note.

The existence of the irrational, as well as that of the regular dodecahedron, appears to have been regarded also by the school as one of their chief discoveries,⁹¹ and to have been preserved as a secret; it is remarkable, too, that a story similar to that told by Iamblichus of Hippasus is narrated of the person who first published the idea of the irrational, namely, that he suffered shipwreck, &c.⁹²

Eudemus ascribes the problems concerning the application of figures to the Pythagoreans. The simplest cases of the problems (Euclid, vi., 28, 29)—those, namely, in which the given parallelogram is a square—correspond to the problem: To cut a straight line internally, or externally, so that the rectangle under the segments shall be equal to a given rectilinear figure. On examination it will be found that the solution of these problems depends on the problem Euclid, ii., 14, and the theorems Euclid, ii., 5 and 6, which we have seen were probably known to the Egyptians, together with the law of the three squares (Euclid, i., 47).

The finding of a mean proportional between two given lines, or the construction of a square which shall be equal to a given rectangle, must be referred, I have no doubt, to Pythagoras. The rectangle can be easily thrown into the form of a gnomon, and then exhibited as the difference between two squares, and therefore as a square by means of the law of the three squares.

Lastly, the solution of the problem to construct a rectilinear figure which shall be equal to one and similar to another given rectilinear figure is attributed by Plutarch to Pythagoras. The solution of this problem depends on the application of areas, and requires a knowledge of the theorems:—that similar rectilinear figures are to each other as the squares on their homologous sides; that if three

⁹¹ *Untersuchungen über die neu aufgefundenen Scholien des Proklus Diadochus zu Euclid's Elementen*, von

Dr. Joachim Heinrich Knoche, Herford, 1865, pp. 20 and 23.

lines be in geometrical proportion, the first is to the third as the square on the first is to the square on the second; and also on the solution of the problem, to find a mean proportional between two given straight lines. Now, we shall see later that Hippocrates of Chios—who was instructed in geometry by the Pythagoreans—must have known these theorems and the solution of this problem. We are justified, therefore, in ascribing this theorem also, if not with Plutarch to Pythagoras, at least to his early successors.

The theorem that similar polygons are to each other in the duplicate ratio of their homologous sides involves a first sketch, at least, of the doctrine of proportion.

That we owe the foundation and development of the doctrine of proportion to Pythagoras and his disciples is confirmed by the testimony of Nicomachus (*n*) and Iamblichus (*o* and *p*).

From these passages it appears that the early Pythagoreans were acquainted not only with the arithmetical and geometrical means between two magnitudes, but also with their harmonical mean, which was then called *ὑπερμετρία*.

When two quantities are compared, it may be considered *how much* the one is greater than the other, what is their *difference*; or it may be considered *how many times* the one is contained in the other, what is their *quotient*. The former relation of the two quantities is called their *arithmetical ratio*; the latter their *geometrical ratio*.

Let now three magnitudes, lines or numbers, *a*, *b*, *c*, be taken. If $a - b = b - c$, the three magnitudes are in arithmetical proportion; but if $a : b :: b : c$, they are in geometrical proportion.⁹⁵ In the latter case, it follows at once, from the

⁹⁵ In *lines* we may have $c = a - b$, or $a : b :: a - b$. This particular case, in which the geometrical and arithmetical ratios both occur in the same proportion, is worth noticing. The line *a* is

then the sum of the other two lines, and is said to be cut in extreme and mean ratio. This section, as we have seen, has arisen out of the construction of the regular pentagon, and we leave

second theorem of Thales (Euclid, vi., 4), that $a - b : b - c :: a : b$, whereas in the former case we have plainly $a - b : b - c :: a : a$. This might have suggested the consideration of three magnitudes, so taken that $a - b : b - c :: a : c$; three such magnitudes are in harmonical proportion.

The probability of the correctness of this view is indicated by the consideration of the three later proportions—

$$\begin{array}{l} a : c :: b - c : a - b \quad . . . \text{the contrary of the harmonical;} \\ b : c :: b - c : a - b \} \quad . . . \text{the contrary of the geometrical.} \\ a : b :: b - c : a - b \} \end{array}$$

The discovery of these proportions is attributed⁹⁶ to Hip-
pasus, Archytas, and Eudoxus.

We have seen also (*g*) that a knowledge of the so-called most perfect or musical proportion, which comprehends in it all the former ratios, is attributed by Iamblichus to Pythagoras—

$$a : \frac{a+b}{2} :: \frac{2ab}{a+b} : b.$$

We have also seen (*g*) that a knowledge of the doctrine of arithmetical progressions is attributed to Pythagoras. This much at least seems certain, that he was acquainted with the summation of the natural numbers, the odd numbers, and the even numbers, all of which are capable of geometrical representation.

Montucla says that Pythagoras laid the foundation of the doctrine of *Isoperimetry* by proving that of all figures having the same perimeter the circle is the greatest, and

from Kepler that it was called by the moderns, on account of its many wonderful properties, *sectio divina, et proportio divina*. He sees in it a fine image of generation, since the addition to the line of its greater part produces a new line cut similarly, and so on. See Kepleri *Opera Omnia*, ed. Frisch,

vol. v., pp. 90 and 187 (*Harmonia Mundi*); also vol. i. p. 377 (*Litterae de Rebus Astrologicis*). The pentagram might be taken as the image of all this, as each of its sides and part of a side are cut in this *divine* proportion.

⁹⁶ Iambl. in Nic. *Arith.*, pp. 142, 159, 163. See above, p. 163.

that of all solids having the same surface the sphere is the greatest."

There is no evidence to support this assertion, though it is repeated by Chasles, Arneth, and others; it rests merely on an erroneous interpretation of the passage (s) in Diogenes Laertius, which says only that "of all solid figures the sphere is the most beautiful; and of all plane figures, the circle." Pythagoras attributes perfection and beauty to the sphere and circle on account of their regularity and uniformity. That this is the true signification of the passage is confirmed by Plato in the *Timæus*,⁹⁸ when speaking of the Pythagorean cosmogony."

We must also deny to Pythagoras and his school a knowledge of the conic sections, and, in particular, of the quadrature of the parabola, attributed to him by some authors, and we have already noticed the misconception which gave rise to this erroneous conclusion.¹⁰⁰

Let us now see what conclusions can be drawn from the foregoing examination of the mathematical work of Pythagoras and his school, and thus form an estimate of the state of geometry about 480 B. C.:—

First, then, as to *matter*:—

It forms the bulk of the first two books of Euclid, and includes, further, a sketch of the doctrine of proportion—which was probably limited to commensurable magnitudes—together with some of the contents of the sixth book. It contains, too, the discovery of the irrational (*ἄλογον*), and the construction of the regular solids; the

⁹⁷ "Suivant Diogène, dont le texte est ici fort corrompu, et probablement transposé, il ébaucha aussi la doctrine des Isopérimètres, en démontrant que de toutes les figures de même contour, parmi les figures planes, c'est le cercle qui est la plus grande, et parmi les solides, la sphère."—Montucla,

Histoire des Mathématiques, tom. I., p. 113.

⁹⁸ *Timæus*, 33, B., vol. vii., c. Stallbaum, p. 129.

⁹⁹ See Bretschneider, *Die Geometrie vor Euklides*, pp. 89, 90.

¹⁰⁰ See above, p. 182, note.

latter requiring the description of certain regular polygons—the foundation, in fact, of the fourth book of Euclid.

The properties of the circle were not much known at this period, as may be inferred from the fact that not one remarkable theorem on this subject is mentioned; and we shall see later that Hippocrates of Chios did not know the theorem—that the angles in the same segment of a circle are equal to each other. Though this be so, there is, as we have seen, a tradition (*†*) that the problem of the quadrature of the circle also engaged the attention of the Pythagorean school—a problem which they probably derived from the Egyptians.¹⁰¹

Second, as to *form* :—

The Pythagoreans first severed geometry from the needs of practical life, and treated it as a liberal science, giving definitions, and introducing the manner of proof which has ever since been in use. Further, they distinguished between *discrete* and *continuous* quantities, and regarded geometry as a branch of mathematics, of which they made the fourfold division that lasted to the Middle Ages—the *quadrivium* (fourfold way to knowledge) of Boetius and the scholastic philosophy. And it may be observed, too, that the name of mathematics, as well as that of philosophy, is ascribed to them.

Third, as to *method* :—

One chief characteristic of the mathematical work of Pythagoras was the combination of arithmetic with geo-

¹⁰¹ This problem is considered in the Papyrus Rhind, pp. 97, 98, 117. The point of view from which it was regarded by the Egyptians was different from that of Archimedes. Whilst he made it to depend on the determination of the ratio of the circumference to the diameter, they sought to find from the

diameter the side of a square whose area should be equal to that of the circle. Their approximation was as follows :—The diameter being divided into nine equal parts, the side of the equivalent square was taken by them to consist of eight of those parts.

metry. The notions of an equation and a proportion—were, as we have seen, introduced amongst the Greeks by Thales. These notions, especially the latter, were elaborated by Pythagoras and his school, so that they raised the rank of a true scientific method in their Theory of proportion. To Pythagoras, then, is due the honour of having supplied a method which is common to all branches of mathematics, and in this respect he is fully comparable with Descartes, to whom we owe the decisive combination of algebra with geometry.

It is necessary to dwell on this at some length, as modern writers are in the habit of looking on proportion as a branch of arithmetic¹⁰²—no doubt on account of the arithmetical point of view having finally prevailed in modern times, whereas for a long period it bore much more the mark of its geometrical origin.¹⁰³

That proportion was not thus regarded by the ancients, but merely as a branch of arithmetic, is perfectly plain to be learned from Proclus that "Eratosthenes looked on proportion as the bond (σύνδεσμον) of mathematics."¹⁰⁴

We are told, too, in an anonymous scholium on the Elements of Euclid, which Knoche attributes to Proclus, that the fifth book, which treats of proportion, is common to geometry, arithmetic, music, and, in a word, to all mathematical science.¹⁰⁵

And Kepler, who lived near enough to the ancients to reflect the spirit of their methods, says that one

¹⁰² Bretschneider (*Die Geometrie vor Euklides*, p. 74) and Hankel (*Geschichte der Mathematik*, p. 104) do so, although they are treating of the history of Greek geometry, which is clearly a mistake.

¹⁰³ On this see A. Comte, *Politique Positive*, vol. iii., ch. iv., p. 300.

¹⁰⁴ Procl. *Comm.*, ed. Freidland.

¹⁰⁵ Euclidis *Elem. Græce* E. F. August, pars ii., p. 328, 1829. *Untersuchungen über aufgefundenen Scholien des Euklid's Elementen*, von D. Knoche, p. 10, Herford, 1861.

geometry is concerned with the comparison of figures and quantities, whence proportion arises ("unde proportio existit"). He also adds that arithmetic and geometry afford mutual aid to each other, and that they cannot be separated.¹⁰⁶

And since Pythagoras they have never been separated. On the contrary, the union between them, and indeed between the various branches of mathematics, first instituted by Pythagoras and his school, has ever since become more intimate and profound. We are plainly in presence of not merely a great mathematician, but of a great philosopher. It has been ever so—the greatest steps in the development of mathematics have been made by philosophers.

Modern writers are surprised that Thales, and indeed all the principal Greek philosophers prior to Pythagoras, are named as his masters. They are surprised, too, at the extent of the travels attributed to him. Yet there is no cause to wonder that he was believed by the ancients to have had these philosophers as his teachers, and to have extended his travels so widely in Greece, Egypt, and the East, in search of knowledge, for—like the geometrical figures on whose properties he loved to meditate—his philosophy was many-sided, and had points of contact with all these :—

He introduced the knowledge of arithmetic from the Phoenicians, and the doctrine of proportion from the Babylonians ;

Like Moses, he was learned in all the wisdom of the

¹⁰⁶ "Et quidem geometriæ theoreticæ initio hujus tractatus duas fecimus partes, unam de magnitudinibus, quatenus fiunt figurae, alteram de comparisonem figurarum et quantitatum, unde proportio existit.

"Hæ duæ scientiæ, arithmetica et

geometria speculativa, mutuas tradunt operas nec ab invicem separari possunt, quamvis et arithmetica sit principium cognitionis."—Kepleri *Opera Omnia*, ed. Dr. Ch. Frisch, vol. viii., p. 160, Francofurti, 1870.

Egyptians, and carried their geometry and philosophy into Greece.

He continued the work commenced by Thales in abstract science, and invested geometry with the form which it has preserved to the present day.

In establishing the existence of the regular solids he showed his deductive power; in investigating the elementary laws of sound he proved his capacity for induction; and in combining arithmetic with geometry, and thereby instituting the theory of proportion, he gave an instance of his philosophic power.

These services, though great, do not form, however, the chief title of this Sage to the gratitude of mankind. He resolved that the knowledge which he had acquired with so great labour, and the doctrine which he had taken such pains to elaborate, should not be lost; and, as a husbandman selects good ground, and is careful to prepare it for the reception of the seed, which he trusts will produce fruit in due season, so Pythagoras devoted himself to the formation of a society of *élite*, which would be fit for the reception and transmission of his science and philosophy, and thus became one of the chief benefactors of humanity, and earned the gratitude of countless generations.

His disciples proved themselves worthy of their high mission. We have had already occasion to notice their noble self-renunciation, which they inherited from their master.

The moral dignity of these men is, further, shown by their admirable maxim—a maxim conceived in the spirit of true social philosophers—a *figure and a step*; but not a *figure and three oboli* (σχᾶμα καὶ βᾶμα, ἀλλ' οὐ σχᾶμα καὶ τριῶβολον).¹⁰⁷

¹⁰⁷ Procli *Comm.*, ed. Friedlein, p. 84. Taylor's *Commentaries of Proclus*, vol. i., p. 113. Taylor, in a note on this passage, says—"I do not find this *ænigma* among the Pythagoric symbols

which are extant, so that it is probably nowhere mentioned but in the present work."

Taylor is not correct in this statement. This symbol occurs in Iambli-

ch, then, were the men by whom the first steps in
matics—the first steps ever the most difficult—were

the continuation of the present paper we shall
the events which led to the publication, through
s, of the results arrived at by this immortal School.

See Iambl., *Adhortatio ad* p. 374. Τὸ δὲ πρότερον τὸ σχῆμα καὶ βῆμα
hiam, ed. Kiessling, *Symb.* τοῦ σχῆμα καὶ τριάβολον.
cap. xxi., p. 317; also *Expl.*

GEORGE J. ALLMAN.

ON THE OGAM BEITHLUISNIN.

IN an article printed in the preceding volume of *Hermathena*, I endeavoured to show, by an analysis of the Beithluisnin, that the Ogam is a cipher, a series of symbols, each of which represents, not a sound, but a letter in an alphabet of the ordinary kind, used at the same time for ordinary purposes. Now, if this conclusion be correct—and to me it seems all but self-evident—we are immediately led to ask, first, What was the real alphabet represented by the Ogam cipher? and next, Is there any evidence of the Ogam having been used for cryptic purposes? To the first of these questions we reply by saying that the Roman letters must have formed the alphabet whose elements were represented by the *feadha* of the Beithluisnin. Of no other alphabet could we assert this with any grounds of probability. Roman letters made their way into Ireland before the coming of St. Patrick. There were Christians there to whom his predecessor, Palladius, was sent by Pope Celestine; and we have very ancient testimony to the effect that St. Patrick, in the course of his missionary labours, met with Bishops who had been in Ireland before his arrival. These Christians cannot have been left without the books which were “written in order that they might know the certainty of those things wherein they had been instructed.” Still less can we suppose that their Bishops were illiterate. The parents of Celestius received, and no doubt were able to read, the letters addressed to them by their son at an early period of his career, towards the end of

the fourth century. Nay more, I would not hastily reject the testimony of the Irish writers who claim for Cormac Mac Art, King of Ireland in the third century, the credit of having been himself an author, and superintended the collection of a body of written Laws and Chronicles. In fact, it seems wholly unreasonable to imagine that Ireland, with its Kings and its Druids, with all its national institutions, civil and religious—for it was not a barbarous country—could have remained unaffected, for hundreds of years, by the social and intellectual influences developed in the neighbouring island during the period of its occupation by the Romans.

Supposing, therefore, that it could be shown from the testimony of the monuments themselves, or in any other way, that the Beithluisnin was in use in Ireland even as early as the first century, nothing would be done to disprove the connexion which I endeavoured to establish in my former paper between it and the Roman alphabet.

And next, if the Beithluisnin be a cipher, it must have been intended to be a secret character. What other purpose could it serve? Hence we are led to seek for evidence to prove that it was cryptic. I propose in this Paper to notice allusions to the use of Ogam occurring in ancient Irish documents of various kinds. A review of them will show, amongst other things, that ancient Irish writers, going back for about a thousand years, believed that the Ogam was not generally written or read, but understood and used only by the initiated: in fact, that it was a cryptic character.

The ancient Irish laws, commonly called The Brehon Laws, contain many allusions to the use of the Ogam character. They speak of Ogam cut on stones, or indestructible rocks, as evidence of the purchase or ownership of land. The stones thus inscribed are said to have been sought in mounds. The inscribed stone is called a monu-

ment or memorial of the *Seanchaidhe*, who was a professional antiquary or historian, charged with duties such as are attached to the office of a notary or registrar. It is also called the memorial or monument of the tribe. The inscription itself is called fair writing, and is distinguished from the kind of writing found in books. Such monuments were set up between two territories or estates as boundary stones; and seem to have contained the name of the owner of the land, of which the pillar-stone (*Gallan*) marked the limit. *Gallan*, or *Dallan*, is still a living word in the counties of Kerry and Cork, and is applied at the present day to pillar-stones which exhibit Ogam characters; and Mason, in his "Parochial Survey of Ireland," vol. iii. p. 611, note, observes that "The stones inscribed with the Ogam character, and occasionally met with through the country, are generally supposed to have been landmarks." Cormac, in his Glossary, gives the word *Gall*, and explains it as a pillar-stone. His etymology, however, is questionable:—

"GALL, *i. e.* a pillar-stone, *e. g.* *nis comathig combatar sila a cobrandaib gall* 'they are not neighbours till their properties are [provided] with boundaries [?] of pillar-stones.' *Gall*, then, means four things, *i. e.* first *gall*, a pillar-stone, ut prædiximus: it is so called because it was the Gaill that first fixed them in Ireland, &c." (*Cormac's Glossary*, Edited by W. Stokes, LL. D., p. 84.)

The ancient *d* so often passed into *g*, that the word might be more naturally referred to *dal*, a division.

The following passages, which may be taken as representing many others of similar import, substantiate the greater part of what has been stated above:—

"How many ever-burning candles are there by which perpetual ownership of land is secured? *i. e.* How many conditions like an ever-burning candle secure the ownership of the territory in perpetuity to the occupant? Memorials (*cuimne*) 'the Historians, of ancient writings, in ancient mound

i.e. if it is secured in the memorial of the tribe (*tuath*), or in the memorial of that fair writing; and that is to be sought for in the old mound." (MS. in Trinity College, Dublin, H. 3, 18, p. 230, b.)

In other passages, in the same tract, where proofs of ownership are enumerated, we read:—

"And when poems record it; *i.e.* when it has been chanted in the long poem, or when it has been recited in the language of the historians. When it has been written in writings; *i.e.* in the books. When it has reached security of stones; *i.e.* when it has been determined to have indefeasible securities for the restoration" [of the land after the term of tenancy has expired].

"The joint memorial of two territories; *i.e.* the common memorial that stands between the two territories; *i.e.* the Ogam in the *Gallan* (pillar-stone), or, it might be the evidence of two neighbours in the two adjoining territories that will prove the man's possession."

"To decide by the recital of a rock; *i.e.* that the name of the man who bought [the land] be in the bond of Ogam; *i.e.* that the Ogam of the purchase be in the flag of a mound [or grave]. That it be written; *i.e.* that it be in old writing. In the presence of credible witnesses; *i.e.* that it be recorded [or kept] by credible persons. Darkness; *i.e.* to be without recital [of the name], without poem, without Ogam."

In a law on taking lawful possession [H. 3, 17], the following passage occurs: "Land which the chief divides after the death of the tenant, where a hole is made, where a stone is put." It is thus explained by the commentator:—

"Where a hole is made; *i.e.* a mound wherein a hole is sunk in the division of the land. Where a stone is put; *i.e.* a pillar-stone, *i.e.* after its being enclosed, *i.e.* the boundary stone; there is a hole and a stone, and the chief's standing stone there, in order that his share there may be known."

The mention of the Ogam in the second of these passages, in conjunction with poems, as a proof of title, points certainly to an early period. But we must not insist too

much upon this fact, seeing that in the same list of proofs reference is made to writings such as were found in books. The reader will also notice that the use of Ogam as an evidence of proprietorship falls in with the notion that this was a cryptic character. It seems natural to suppose that when a bargain was made, the *Seanchaidhe* recorded it in a character which was not commonly known—neither written nor read by ordinary persons. If a dispute arose afterwards about the ownership, the *Seanchaidhe* of that time would have been able to read the inscription. It would have been a part of his official business. But the forgery of an Ogam would not have been an easy matter in those days. This can hardly be regarded as a conjecture. In the tract on the names, qualifications, and privileges of the seven degrees of Poets, we find that men belonging to the literary hierarchy were bound to study the Ogam character. When we come to treat of the Ogam monuments themselves, the reader will see that many of them have been found in caves in the interior of raths. These were perhaps the mounds [*ferta*] spoken of in the ancient laws. The meaning of the word *fert* is not fixed. It commonly means a tomb or grave; sometimes an earthen fence or dike thrown up by the spade.

Monuments with Runic inscriptions were in like manner used to record the ownership of property. “Von einigen wird angegeben, welche Güter und Höfe sie besaßen: Von Ragnfast wird erwähnt, dass er nach seinem Vater Sigfast *allein* diesen Hof oder Wohnort besass, nämlich Snotestad, wo der Stein steht: Jarlabanka besass *allein* ganz Täbi; und Björn Finwidsson bestätigt, dass er eine Platte im Kirchspiel Danderyd nach seinem Bruder Oleif errichtete, welcher hintergangen wurde, und dass dieser Ort das Erbe und Besitzthum der Finwidssöhne in Elgestad ist. (*Die Runendenkmäler des Nordens, nach Joh. G. Liljengren bearbeitet*, von KARL OBERLEITNER. Wien., 1848).

When the poet attached to a tribe or family failed to

receive the remuneration due to him for one of his compositions, the Irish law directed him to seek his remedy by the following curious procedure :

“ Let an Ogam alphabet be cut [on a four-square wand], and an *Ua* alphabet; *i.e.* let the writing begin in the name of God. And the efficacy of this is to inscribe a Cross in the first edge for a notice; the name of the offence in the second edge; the name of the offender in the third edge; and encomium in the fourth edge. And let the wand be set up at the end of ten days by the poet of the *trefocul*. Or, [it is necessary] that the notice should be at the end of ten days. If he [the poet] has neglected [to set up] his wand, and has made a satire, he is liable for the *Eraic* for a satire. If he has made a seizure, he must pay the fine of an illegal seizure.” (H. 3, 18, p. 424.)

The *trefocul* here spoken of was a kind of poem, each measure of which consisted of three words—two words of praise, followed by one word of satire; and this was considered the highest praise.

The weight of the testimony borne by the Brehon Laws to the use of the Ogam character is unquestionable. These laws, as they have come down to us, are genuine documents, which were employed by judges in the discharge of their duties, and by jurists in giving instruction in their law-schools.

But the question as to the time at which they assumed their present form, how much is the substance of the Ancient Law, and how much has been added by comparatively recent Brehons and commentators, has not yet been decided; neither can it be, until the language and substance of the laws has been subjected to a careful analysis by competent philologists and jurists. Meanwhile, with all readiness to acknowledge their genuineness and antiquity, I see no reason to admit that the notices of Ogam contained in them refer to a period anterior to the introduction of Roman letters and Christian civilisation; and point, in con-

firmation of this view, to the fact that no mention of Ogam occurs in the text of the Book of Aicil, or in that of the *Senchus Mor*, supposed to be the oldest codes of Irish law. For the present, I venture to avow my belief that the commentaries are for the most part as recent as the tenth or eleventh century; and that even in the texts, however ancient may be the substance of the laws, we do not meet with such a prevalence of the ancient grammatical forms as, according to Zeuss's view, would characterise the language as Old Gaedhelic.

Let us now turn to the ancient Irish tales and poems, to gather from them what information they supply with respect to the use of Ogam. They speak frequently of Ogam as employed to record the names of deceased persons on sepulchral monuments. The following is the formula commonly used in such cases:—"The grave was dug, the funeral games were held, and *the Ogam name* was inscribed on a stone erected over his grave." In other passages, mention is made of Ogam used to convey information, in such a way that the communication was understood by the initiated, whilst it was unintelligible to ordinary persons. Ogams of this kind were generally cut in wood. We also meet with instances in which Ogam is said to have been used for purposes of divination or incantation. Whilst the occult nature of the Ogam is thus frequently and plainly brought under our notice, I have not met with a single passage which is inconsistent with this view. The ancient Irish writers, whatever be the value of their testimony, believed, one and all, that the Ogam was a cryptic mode of writing.

The following passage is taken from an account of the death of Fiachra, the son of Eochaidh Muighmhedhoin, and brother of Niall of the Nine Hostages. The whole story has a very pagan aspect:—

Then the men of Munster gave him battle in Caenraighe. And

Maidhi Meascorach wounded Fiachra mortally in the battle. Nevertheless, the men of Munster and the Erneans were defeated by dint of fighting, and suffered a great slaughter. Then Fiachra carried away fifty hostages out of Munster, together with his tribute in full, and set forth on his march to Tamar. Now when he had reached Forraidh in Uibh Maccuais in West Meath, Fiachra died there of his wound. His grave was made, and his mound was raised, and his *cluiche cainte* (funeral rites, including games and dirges) were ignited, and his Ogam name was written, and the hostages which had been brought from the south were buried alive round Fiachra's grave.—[*Book of Ballymote*, fol. 145, bb.]

Dr. Petrie has drawn attention to the following very ancient story preserved in the *Leabhar na h-Uidhre*, which details the circumstances connected with the death of Fothadh Airgthech, who was for a short time monarch of Ireland, and was killed by the warrior Cailte, the foster-son of Finn Mac Cumhaill, in the battle of Ollarba, fought, according to the "Annals of the Four Masters," in the year 285. In this tract, Cailte is introduced as identifying the grave of Fothadh Airgthech, at Ollarba, in the following words:—

. . . The ulaidh (carn) of Fothadh Airgthech will be found at a short distance to the east of it [the iron head of a spear buried in the earth]. There is a chest of stone about him in the earth. There are his two rings of silver, and his two *bunne doat* [bracelets?], and his torque of silver on his chest; and there is a pillar stone at his carn; and an Ogam is [inscribed] on the end of the pillar stone which is in the earth. And what is in it is, Eochaid Airgthech here.—(*Leabhar na h-Uidhre*, fol. 133, bb.)

But Dr. Petrie does not seem to have noticed some circumstances mentioned here which claim our attention. First, the fact that the Ogam was inscribed on the end of the pillar-stone which was in the earth, and therefore intentionally concealed from view. Why should this be, unless there were something disgraceful connected with the birth, life, or death of the person who was buried

there? Next, the epithet *Airgthech* appears to declare the nature of the stigma thus secretly recorded. *Airgthech* means a robber or plunderer. Again, is it not perplexing to find that the person called Fothadh Airgthech in the story is named Eochaid Airgthech in the Ogam inscription? It is not impossible that *eochaid* may have been substituted for *fothadh*, a name very like it, by the error of the transcriber. But it is also possible that the Ogam name inscribed on the pillar-stone was not the name by which the monarch was commonly known. He and his brother, Fothadh Cairptheach, are mentioned in the "Annals of Clonmacnoise" as joint monarchs of Ireland. But it is added that they "were none of the Blood Royal." Tighernach does not mention either of them as kings of Ireland, evidently because he regarded them as usurpers. Fothadh Airgthech slew his brother, Fothadh Cairpthech, and reigned, if he ever was king, only for a single year (see "Annals of the Four Masters," at the year 285 A. D.). There is yet another circumstance which throws a shade of doubt or discredit on this story. Antiquaries do not believe that silver ornaments were in use in Ireland in the third century. The torques and armlets of that time are believed to have been of gold.

In the ancient tract entitled the Dialogue of the Sages (*Agallam na Seanonac*), this same Cailte, who is said to have lived till the coming of St. Patrick, and to have communicated to him much of the ancient history of Ireland, gives an account of Finn's marriage with Aine, the daughter of Modhurn, king of Scotland, and of her subsequent death. It ends thus:—

And Finn had her for six years after that, and she bore him two sons—Iollan Faebarderg and Aedh Beg. She died in giving birth to Aedh, and she was buried in this mound near us. Her tombstone was raised over her grave, and her Ogam name was written and her *cluiche cainte* were held.—[*Book of Lismore*, fol. 123, aa.]

We have a similar notice of a monumental inscription placed by Finn and his followers over Art and Eoghan, two sons of the king of Connaught, who served in Finn's host, and were killed by foreigners at the strand of Rory, in Ulster.

We, the Fiann, said Cailte, both high and low, great and small, king and knight, raised a loud shout in lamentation for the brave and valiant champions. And a mound was dug for each of them; and they were put into them; and his own arms along with each. Their tombstones were raised over their graves, and their Ogam names were written then.—[*Book of Lismore*, fol. 121, b.]

It is not stated that their names were written in Ogam (*tri Ogam*), but that their *Ogam names* were written.

A like account is given of the burial at Benn Edair of Edain, the wife of Oscar, son of Oisín. She died of grief at seeing the dreadful wounds of her husband after the battle of Benn Edair.

She shed floods of tears, and raised a loud and piteous cry of lamentation. Then she went to her own bed, and her heart broke, and she died straightway of grief for him who was her husband and her first love, though a spark of life still remained in him. Finn was filled with sorrow for this, and so were the Fiann of Erin, said Cailte; and we carried her to the fairy mansion of Ben Edair for burial, and we spent that night around Edain, dejected and weeping. Finn bade his followers dig a mound for the woman on the morrow. They did so. They dug a mound, and they buried her, and they put her tombstone over her grave, and her Ogam name was written, and her *cluiche cainte* were held by the champions; and the mound is named after her, *Fert Edain*, at the fairy mansion of Edair.—(Hodges & Smith MS., R. I. A., p. 149.),

So again, when Etercomol was slain by Cuchulainn, we read in the *Tain bo Cuailgne*, that his Fert was dug, his *lia*, or headstone, was set up, his Ogam name was written, and his funeral rites were celebrated (*Leabhar na h-Uidhre*, p. 69, col. 1); and the same formula occurs at the end of the tale

called the Elopement of Deirdré with the Sons of Uisnach.—
(*Transactions of the Gaelic Society, Deirdré*, Dublin, 1808,
p. 129.)

The *Book of Leinster* preserves a poem attributed to
Oisín, in which mention is made of an Ogam inscription of
the same kind:—

An Ogam in a *lia*, a *lia* over a *leacht*,
In a place whither men went to battle,
The Son of the King of Erin fell there,
Slain by a sharp spear on his white steed.

That Ogam which is in the stone
Around which the heavy hosts have fallen,
If the heroic Finn had lived,
Long would the Ogam be remembered.

(H. 2, 18, fol. 109, *b. a.*)

In the valuable work on Christian Inscriptions in the
Irish language, just completed by Miss Stokes, we are pre-
sented with a poem by Enoch O'Gillan, of which the fol-
lowing are the first two stanzas:—

Ciarán's city is Cluain-mic-Nois,
A place dew-bright, red-rosed.
Of a race of Chiefs whose fame is lasting,
[Are] hosts under the peaceful clear-streamed place.

Nobles of the Children of Conn
Are under the flaggy brown-sloped cemetery;
A knot (*snaidm*) or branch (*craebh*) over each body,
And a seemingly, correct Ogam name.

[*Christian Inscriptions in the Irish Language*, chiefly
collected and drawn by George Petrie, LL.D.,
and edited by M. Stokes, p. 8.]

It appears, then, that Christian chieftains were buried at
Clonmacnoise with Ogam names inscribed on their monu-
ments. Only one Ogam inscription has been found there,

so far as I know. It bears the name of COLMAN in letters of the ordinary kind, followed by the epithet *bocht*, written in Ogam characters, from right to left. This single word, meaning poor or needy, and written in a form which was doubly cryptic, seems to have been intended to express disparagement.

An instance in which Ogam is said to have been used for the purpose of conveying information occurs in a poem by Oisín, in which he relates a tale of his father Finn. Finn happening to be with a party of his Fiann on Slieve Crot, in Munster, a noble youth, accompanied by a beautiful lady, came into his presence, and announced that he had travelled from Norway and Lochlann, but had met no man able to beat him at chess. Finn accepted his challenge, and the stranger staked his wife against fifteen of the Fenian women who were present. The stranger won the game, and immediately disappeared, enveloping himself and the sixteen women in a magical mist. Finn resolved to follow him to Norway, but desiring to let his followers know whither he had gone, he cuts an Ogam—

A pillar stone there was on the rugged hill,
Whither the hosts were wont to come—
Finn knotted an Ogam in its edge,
That no man should be ignorant.

A year were they (the Fiann) without tidings of their king,
All that time they were distressed,
Until they came to Dun Crot,
When they had left Finn of the keen blade.

Mac Lugach found in the pillar stone
An Ogam which he understood,
That Finn had gone in search of his women
Unto Eoghan, the King of Lochlann.

(Hodges & Smith MSS., R. I. A., p. 444.)

If the writing had been intelligible to everyone, there would have been no reason to mention that it had been found *and understood* by Mac Lugach.

In *Cormac's Glossary*, under the heading ORC TRÉITH, a strange story is told of Finn and his fool Lomna. The fool having discovered that his master had been dishonoured during his absence from home, and not choosing to be concerned either in betraying him, or in directly accusing the guilty person, cut an Ogam on a four-square rod, so as to communicate his discovery to Finn as soon as he returned. Finn, understanding the Ogam, manifested his displeasure in such a way that the woman who had wronged him became aware that Lomna had divulged her secret. She quickly avenged herself by procuring the murder of the fool; and the story goes on to record a conversation between the woman's paramour and the decapitated head of the fool, whom he had slain.—(*Cormac's Glossary*, edited by Whitley Stokes, LL.D., p. 130.)

The secret nature of the Ogam character could not be more plainly indicated than it is in this passage.

Corc, son of Lugaidh, King of Munster, was banished by his father, and fled to Scotland about the year 600. There his person and rank were recognised by Gruibne, the Druid and Poet of Feradach, King of Scotland. The Druid, observing an Ogam in the shield of the prince, by whom his life had formerly been saved in Ireland, asks him, "Who hath supplied thee with the Ogam which is in thy shield? It is not luck he hath brought thee." "What is in it?" said Corc. "This is what is in it," answered the Druid: "If thou come to Feradach by day, that thy head be off before evening; if by night, that it be off before morning."—(*Book of Leinster*, fol. 206, aa.)

Observe that the prince cannot read the Ogam on his own shield. But the Druid is able to decipher it. This story reminds us of the *σήματα λυγρὰ*, which Bellerophontes

carried with him to Lycia, unconscious of their fatal import. Note, too, that in the *Edda*, mention is made of Runes on shields.—(*Edda Rythmica*, Brynhildar-Quida, I., Stroph. xv.) Corc's shield was probably made of alder wood.

The following is the only passage in which I have read of an Ogam cut upon iron :—

They went forward to the Dun ; and the youth (Cuchulainn) alighted from the chariot in the green. The green of the Dun was on this wise. There was a pillar-stone upon it, and an iron ring round the pillar ; and this was a ring of championship ; and there was an Ogam name in the *menuc* [?], and this was the name that was in it :—“Whoever comes on the green, if he be a champion, he is enjoined not to depart from the green without giving challenge to single combat.” The little boy (*an Mac Beg*) read the name, and he put his two hands to the pillar-stone as it stood with its ring, and cast it into the pool, and the water closed over it.—(*Book of Leinster*, p. 66, col. 1.)

Cuchulainn, instructed in all military exercises and accomplishments, is able to read the Ogam. It was only addressed to persons of his class—to knights.

Keatinge says that one of the conditions which each warrior was obliged to fulfil previous to his admission into the ranks of the Fiann was as follows :—No man could be admitted into the Fiann until he had become a bard, and had mastered the twelve books of Poetry.

In the Táin Bo Cuailgne we meet with curious instances of the use of Ogam, which I give at length, in order that the reader may see the reasonableness of the inference which I draw from them :—

Cuchulainn, the great hero of this war, coming to a certain pillar-stone, at a place called Irard Cuillenn, makes a ring out of a rod, writes an Ogam in it, and then throws it over the pillar, so as to encircle it. The invading army, led by Fergus Mac Roich, coming up to the place, the ring is found by their scouts, Err and Inell, with Foich and Fochlam, their two charioteers. These were

the four sons of Irard mac Anchinne, who always went in advance of the host to save their brooches and garments from the splashing of the mire and the dust raised by the troops in their march. Finding the ring which Cuchulainn had cast, they gave it into the hand of Fergus, who read the Ogam which was in it. "For what wait you here?" said Queen Meave, coming up. "We halt," said Fergus, "because of this ring. There is an Ogam in the *menuc*, and this is what it signifies: Go no further till a man is found who with one hand will cast a ring like this, made of a single rod; and let my master Fergus answer." "It is true," said Fergus, "it was Cuchulainn who cast the ring; and it was by his horses the plain was so closely grazed. Then he gave the ring into the hand of the Druid, and spake the following poem. . . . (*Lachar na h-Uidhre*, p. 57.)

In this passage the occult nature of the Ogam is plainly indicated. The scouts could not read it. They were obliged to bring it to Fergus, who possessed all the attainments of an accomplished knight, in order that he might decipher it. This is made more evident in the later and more developed version of the story, as we find it in the *Book of Leinster*, pp. 59 and 60:—

And Ailell (the king) took the ring into his hand, and put it into the hand of Fergus, and Fergus read the Ogam name that was in the *menuc* of the wood; and declared to the men of Erin what was signified by the Ogam name which was in the *menuc*. So he began to tell it; and he spake this poem:—

A ring here, what doth it declare unto us?
A ring: what doth its *mystery* conceal?
And what number of persons placed it here?
Were they few or were they many?

If ye should march past this to-night,
And not remain here in encampment,
The Hound of all terrors will surely visit
On you your contempt and dishonour of him.

It will bring evil on the hosts
If they pursue their march beyond this.
Discover now, O Druids !
Why this ring was made.

[*Answer of the Druids.*]

He disables champions, the champion who placed it.
Utter discomfiture he brings on heroes.
To check [the advance of] the chiefs of men assembled,
One man placed it with his one hand.

'Tis the work of a man whose anger was roused,
The hound of the South in the Creeve Roe.
'Tis the knot (*snaidm*) of a champion, not the tie of a fool ;
'Tis his name that is in the ring.

To inflict the calamity of hundreds of combats
Upon the four provinces of Erin,
Unless it be for this, I know not
Why this ring was made.

After the delivery of that poem, " By my word," said Fergus, " if
re disregard that ring, and the royal champion who made it, without
making a night's enclosure and encampment here, unless a man
amongst you shall make a ring like this, (standing ?) on one foot,
and with one hand and one eye, like as he has done, whether ye
be laid under the earth or in a fortress, he will inflict wounds and
death on you before it is time to rise to-morrow."

The following passage is taken from the *Book of Leinster*. The corresponding portion of the text is found in the *Leabhar na h-Uidhre*, page 58 :—

And he came to the lake of a great wood by Cnoghba-of-the-Kings, on the north, which is now called Ath n-Gabhla. Then Cuchulainn went into the wood, and alighted from his chariot, and put down a fork with four prongs, root and branch, at a single stroke. He shaped and fashioned [? squared] it, and put an Ogam

name upon its *menuc*, and he threw it with an unerring cast, from the hinder part of his chariot, from the tips of his fingers, so that two-thirds of it went into the ground, and only one-third remained above. It was then that the two [four] guides above-mentioned, viz., the two [four] sons of Tocan came up to him whilst thus employed; and they strove which should be the first to wound and behead him. But Cuchulainn turned upon them, and cut off their four heads on the instant, and he fixed the head of each man on one of the prongs of the fork. And Cuchulainn sent the horses of that party back the same way to meet the men of Erin, with their reins loose, with the gory trunks, and the bodies of the warriors dropping blood on the frames of the chariots: because he thought it not honourable or becoming him to take the horses, or clothes, or arms of the men that were slain. Then the hosts beheld the horses of the party who had been in advance of them, and the headless bodies of the warriors dropping down blood copiously on the frames of the chariots. The van of the host halted for the rear to come up; and they all raised loud cries, and clashed their arms. . . . "What have we here?" said Meave. "We will tell," said they. "The horses of the party who always went before us are there, and their headless bodies in their chariots." Then they held a council, and they concluded that these were the tracks of an army, and the contact of a great host; and that it was the Ultonians that had come. And the counsel they found was to send Cormac Connlonges mac Concobar to discover who it was that was in the ford. Because if it were the Ultonians that were there, they would not kill the son of their own lawful king. Then Cormac went forth; and the number of the company that he took was three thousand armed men, to find out who was in the ford. And when he came thither, he saw nothing but the fork in the middle of the ford, with four heads on it dropping their blood copiously down, the body of the fork [fixed] in the stream, the foot-prints of two steeds, the track of a single chariot, and the trace of a single champion going out of the ford eastwards. The nobles of Erin came to the ford and they all began to view the fork. It was a matter of surprise and wonder to them who it might be that had set up the trophy "What was the name of this ford hitherto with you [Ultonians] Fergus?" said Ailell. "*Ath n-Grena*," said Fergus; "and *Ath*

·*Gabhla* shall be its name henceforth for ever, because of this fork
and this deed," said Fergus. And he spake this poem—

Ath-Grena will now change its name,
By the deed of the hound [Cu-chulainn] red and furious ;
Here is a fork of four prongs,
Which is a hindrance to the men of Erin.

On two of the prongs are signs of valour,
The head of Faech and the head of Fochlainn ;
On the other two prongs are
The head of Eire and the head of Innill.

What Ogam is this in its *menuc* ?
Tell us, O ye Druids most learned.
And who was it that hath marked it in it ?
What number helped to plant it ?

[*Answer of the Druids.*]

Yonder fork of terrible import
Which thou seest there, O Fergus,
Was cut by one man, whom thou didst once love,
At a single sweeping stroke of his sword.

He fashioned and brought it on his back.
Even this was no trifling achievement.
And he planted it down there,
That one of you might pluck it up from the earth.

Ath n-Grena was its only name until now ;
Well is it remembered by your people ;
Ath n-Gabhla shall be its name evermore,
From this fork which you see in the ford.

(*Book of Leinster*, pp. 59-60.)

The Ogam seems to have intimated that it was Cuchul-
ainn who had killed the scouts and set up the trophy as a chal-
lenge to the enemy, defying any single man amongst them
to pluck up the stake which he had planted with one hand.

From the first stanza of the poem, it appears that Fergus understood the Ogam, which was unintelligible to the rest of the host. He had been Cuchulainn's friend, and master: and possessed all knightly accomplishments. But he refers to the Druids to confirm his interpretation.

This is not the only instance where Cuchulainn gives a notice or challenge to his enemies by means of an Ogam. At Magh Mucceda he cuts down an oak, and writes an Ogam on its side, and this is what was on it when found by Ailill's host;—"Whoever passes this shall be slain by a hero of one chariot."—(*Leabhar na h-Uidhre*, p. 63, col. 2.)

Cuchulainn knew that in the host of Ailill and Meave there were men who could read Ogam—Fergus Mac Roich and the Druids, if not others.

If the Ogam was a cryptic mode of writing, we might expect to find it employed in divination. I am able to give instances of this kind from tales which are certainly as ancient as others from which I have quoted:—

Eochaidh Airem, according to the Irish Annalists, monarch of Ireland about one hundred years B. C., was visited at Temar by a youthful stranger, who announced himself as Midir of Bri Leith. Bri Leith was a famous fairy hill and mansion in the County of Westmeath, in which dwelt Midir, a hero renowned for his gallantry. The king inquired of him his business. Midir answered that he came to play a game of chess with the king. The king consented. Midir won the game, and as winner of the stakes claimed permission to embrace the Queen Etain. The king was compelled to consent, else he would have been branded with falsehood, which was in those days the greatest dishonour that could be laid to the charge of a king. Then Midir threw his arms round the queen, and flew with her out of the palace, no one could tell whither. After some time had gone by,

Eochaidh sent his Druid Dallan to search for Etain. . . . That day he travelled westwards until he reached the mountain which is called Slieve Dallan; and he abode there for the night. Then the Druid was grieved that Etain should remain concealed from him for a whole year; and he made four wands of yew, and wrote an Ogam on them; and it was revealed to him, through his keys of poetic knowledge, and through his Ogam, that Etain was in the fairy mansion of Bri Leith, whither she had been carried by Midir.

This extract was made for me by Professor O'Curry, from a tale entitled "Tocmarc Etaine"—"The Courtship of Etain"—preserved in one of the MSS. which formerly belonged to Mr. Monck Mason, written about the year 1450. There are fragments of the beginning and end of the same tract in *Leabhar na h-Uidhre*; but this part has not been preserved in that MS. Copies of this tale are also to be found in the *Yellow Book of Lecain* (H. 2. 16), and in the MS. H. 1. 13, a paper MS. in T. C. D. *The Courtship of Etain* is named in the *Book of Leinster* as one of the principal tales which a duly qualified poet was bound to know, and be able to recite to kings and chiefs.—[O'Curry's *Lectures on the MS. Materials of Ancient Irish History*, p. 584.]

Another example of the use of Ogam for the purposes of divination occurs in an ancient tale entitled "The Exile of the Sons of Duil Dermait."

In this tale we are told that three personages mentioned in it disappeared mysteriously, and that Cuchulainn was enjoined to discover them. It is stated that he accordingly went from the palace of Emania to his own town of Dun-Dealgan (or Dundalk), and that, while taking counsel with himself there, he observed a boat coming to land in the harbour. This boat, it seems, contained the son of the King of Albain (Scotland), and a party who came with presents of purple, and silks, and drinking

cups for King Conor Mac Nessa. Cuchulainn, however, being at the moment in an angry mood, entered the boat, and slew all the crew, till he came to the prince himself. The tale then proceeds :—

“Grant me life for life, O Cuchulainn ! Thou dost not know me,” said the prince. “Knowest thou what carried the three sons of Duil Dermait out of their country ?” said Cuchulainn. “I know not,” said the youth ; “but I have a sea-charm, and I will set it for thee, and thou shalt have the boat, and thou shalt not act in ignorance by it.” Cuchulainn then handed him his little spear, and the prince inscribed an Ogam in it.

Cuchulainn then, according to the story, went out to sea, and his talisman directed him unerringly to the island, where the objects of his search were detained.—(Trin. Coll. Dublin, H. 2. 16.)

The following passage, taken from Cormac’s *Glossary*, is perhaps the most curious and important of all those in which allusion is made to the use of Ogam by ancient Irish writers :—

FE ab eo quod est *ve* i. e., *væ*, for with the Gaels it is usual for to answer to the *v* (or to be in place of the *v*) consonant ut prædiximus. *F℥*, then, is a wand of aspen, and gloomy the thing which served with the Gaels for measuring bodies and graves; and this wand was always in the cemeteries of the heathen, and it was a horror to every one to take it in his hand, and everything that was odious to them they marked on it in Ogam. Inde dicitur :—

Sorrowful to me to be in life
After the King of the Gaels and Galls.
Dim is my eye, wasted my flesh,
Since the *f℥* was measured on Flann.

Aliter, a rod of aspen was used by the Gaels for the measuring of the bodies, and the graves in which they were interred; and this wand was always in the cemeteries of the heathen, and it was a horror to every one taking it in his hand; and everything that was

ous with the men was struck with it, unde in proverbium venit *fris* "a fé to it"! for as the wand was odious cui nomen est *fl* sic alia res cui comparatur. For it was the aspen of which the wand had to be, and it is odious. Therefore, says Morann, in the *iathar Ogam, aercaid fid edath, i. e.*, the reproach which attached the rod cui nomen est *fl*.

The whole passage connects the use of the Fé with notions of superstition, and carries us back to times when Paganism still subsisted in Ireland. The wand was kept by the Gaels in the cemeteries of the heathen. It was in every way odious. It was made of aspen, an unlucky tree. It was used for a gloomy purpose, to measure corpses and graves. And it had symbols of what was hateful cut upon it.

It seems, too, that a baleful charm was supposed to have been wrought by striking with it whatever was itself the object of detestation. What M'Curtin says of the Ogam aobh in general helps us in some degree towards the explanation of all this:—

The Irish antiquaries have preserved this Ogam in particular a piece of the greatest value in all their antiquity, and it was fatal for any but those that were sworn antiquaries either to touch or use the same. For in these characters those sworn antiquaries wrote all the evil actions and other vicious practices of their monarchs and great personages, both male and female, that it should not be known to any but to themselves and their successors, being sworn antiquaries as aforesaid.—[*Treatise on the Irish Grammar at the end of M'Curtin's English-Irish Dictionary*. Paris, 1732.]

The practice of striking with an Ogam-marked rod is mentioned in a medical MS. of the date 1509, in the Library of the Royal Irish Academy. As a cure for a man rendered impotent by charms, it is there recommended to write the man's name in Ogam on an elm wand, and to strike the man with it.

As regards the stanza in which reference is made to the

death of Flann, it must be observed that it cannot have been introduced by Cormac Mac Cullinan himself. The Flann here mentioned can hardly have been any one else but Flann Sinna, King of Ireland, who died of the plague in the year 914, eleven years after the death of Cormac. The poem must have been interpolated by a subsequent editor of the *Glossary*, and this is not improbable. A collation of the MSS. of Cormac's *Glossary* has shown that considerable additions have been made to it by later hands; and further, the interpolator could hardly have been a friend or follower of Cormac, who was killed in battle, fighting against Flann Sinna. The words which state that the wand was odious, as being made of aspen, refer to a phrase in one of the verbal Ogams contained in the *Ogam Tract*. As the Fé, said to have been kept in the cemeteries of the heathen, was used to measure the body of Flann, who was a Christian, we are left to infer that an old Pagan custom had been transmitted from ancient to modern times.

It may be worth our while to consider whether the Fé has any relation to the Scotch *Fey*, or the Icelandic *feigr*. But I abstain here from etymological speculations.

These are our testimonies. But before we draw conclusions from them we are bound to consider the circumstances which determine their weight. Many of these pieces are found in MSS. dating from the eleventh and twelfth centuries, and there is reason to believe that the substance of them was more ancient, even by hundreds of years. Still there remains a question as to the credibility in matters of detail of stories professing to record events which are referred to the third century, or even to the commencement of the Christian era, when we find that these tales are full, not only of exaggeration, but of manifest fiction, and are written in a turgid style, which distinguishes them from historical narrations. Though Professor O'Curry

assigned a high, perhaps the highest, place in the list of our ancient Irish historical tales to the *Tain bo Cuailgne*, from which I have made so many extracts, I confess that I find it difficult to give it the praise which it has received as a great prose Epic, or as a piece the main statements of which respecting matters of fact are substantially true. I fancy that I see in it traces of comparatively modern thought; and am rather inclined to concur in the judgment pronounced by the learned scribe who copied it into the *Book of Leinster* in the twelfth century, and perhaps expended on it some editorial care. The following is the colophon which he appended to his transcript of the *Tain*:—

A blessing on every one who shall faithfully study the *Tain* as it is here, and who shall not add to it in any other shape.

Sed ego qui scripsi hanc historiam, aut verius fabulam, quibusdam fidem in hac historiâ, aut fabulâ, non commodo. Quædam enim ibi sunt prestigia demonum, quædam autem figmenta poetica, quædam similia vero, quædam non, quædam ad delectationem stultorum.

Nevertheless, even admitting that the element of fiction abounds in the tales from which our quotations have been taken, their concurrent witness sufficiently proves the existence in the minds of their authors of a belief that the Ogam was in use in times long anterior to their own; that it was a cryptic character; and that there was something peculiar in the form of the Ogam names inscribed on sepulchral monuments.

The first twenty characters of the Ogam craobh are peculiarly well suited for cutting on wood; whether on the edge of a square stave, or on a round rod; seeing that all the strokes are rectilinear, and admit of being cut either exactly at right angles with the grain, or obliquely across it. The same may be said of the first, second, and fourth

of the *forfedha*, or diphthong symbols. Anyone who tries will find that if a stroke coincides in direction with the grain, it will not be easy to make it with a clean ending, and of the proper length. Such a stroke will require an additional cut at the end to finish it.

That the Ogam craobh was first used in this way before it was employed in inscriptions on stone is extremely probable. According to the apocryphal account given in the Ogam Tract, the first Ogam was cut upon a birch wand; and the passages which I have quoted from ancient Irish romantic tales indicate that the practice of cutting these characters on wood was common. The testimony of Martianus Capella,

Barbara fraxineis sculpatur runa tabellis,

proves that Runes were cut upon planed ashen tablets in the fifth century. The practice may therefore have been considerably older. And Saxo Grammaticus (lib. iii.) speaks of letters graven on wood (*literæ ligno insculptæ*) as having been *quondam celebre chartarum genus*. Now the Ogam character is at least as well suited for this purpose as the Rune. It is simpler than the Twig-rune, and looks like an improvement upon it, after passing through the intermediate and imperfect state in which it appears in the first Beithluisnin figured in page 455 of the last vol. of Hermathena. First came the Twig-rune, with its upright stem and side branches inclined at an acute angle to the stem; or, perhaps, the Hahel-run, described in the Alcuin MS. These, according to my view, suggested the primitive Ogam with its upright stem, and its branch-strokes meeting the stem obliquely or at right angles; and from this finally the transition was easy to the perfect Ogam craobh. All that was necessary was to substitute a single stem-line, or the edge of a squared sta

for the straight line formed by placing the stem-strokes of the rune-like Ogams so as to be continuous.

Let us next consider what was actually written in Ogam upon wood. Was it only a name, or a sentence of a few words? or was it something more, as Professor O'Curry and others have asserted? He held the belief "that the pre-Christian Gaedhils possessed and practised a system of writing and keeping records quite different from and independent of both the Greek and the Roman form and characters." "He maintained, in fact, that the Ogam character was employed to record historical events and even sustained historical or romantic tales among the Gaedhils, long before the supposed introduction of the Roman letter, about the time at which the Gospel of Christ was brought among them by lettered scholars of Continental education." And in support of this hypothesis he endeavoured to show that histories and tales were inscribed in Ogam on staves or wooden tablets. If he could have adduced satisfactory proof of this, it is not likely that he would have attached much importance to the testimony of the following romance, on which he has commented at length in his lectures :—

"About the commencement of the first century of our era, two lovers, Baile mac Buain, an Ulster chieftain, and Ailinn, a Leinster Princess, died suddenly of grief; each having been deceived by false tidings of the other's death. Out of the grave of Baile a yew tree presently sprang up; and from the grave of his beloved Ailinn, an apple tree. In seven years, the two trees grew large, with leafy heads bearing a resemblance to the two lovers whose graves they over-shadowed. They were then cut down by the poets, and each was made into a tablet (*tabhall filedh*). In one were written the Visions, and the Espousals, and the Loves, and the Courtships of Ulster: in the other the tales of like import relating to the kingdom of Leinster. In the

time of Art, King of Ireland, that is, about a hundred and fifty years afterwards, these tablets, being brought face to face, flew towards each other of their own accord, and became joined so firmly that they could not be separated. They were thenceforth preserved amongst the precious things kept in the treasury at Tara, till the palace was burned in the year 241."

The reader will smile at finding an argument respecting the use of letters in Ireland some eighteen or nineteen hundred years ago founded in all seriousness on this romantic tale. The writer of it had probably read the story of Daphne in Ovid's *Metamorphoses*, and that of Polydorus in the *Æneid*; and was thinking of the waxed *tabula*, commonly used during the Middle Ages, as well as in the time of ancient Rome. The reader may see in the Museum of the Royal Irish Academy one of these tablets, still preserving some legible characters; and will be interested in reading Dr. Todd's description of it, printed in the "Transactions" of that Society. I suspect that the *taibhí fíledh*, so often mentioned by Irish writers, were nothing more than tables of this kind. But there may have been something peculiar in their formation, as we find the following entry in a Catalogue of the contents of the library of St. Gall:—"Sex lignæ tabulæ cera obductæ (olim pugillares Scotticæ dictæ) quæ ratiocinia referunt." Who could imagine all the love stories of two kingdoms scored in Ogam on the edges of staves? Cartloads of timber would not have sufficed for the purpose. Even Professor O'Curry seems to have been prepared for the incredulity of persons who, like myself, will say that the letters inscribed on these mystic tablets "could not well have been Ogam" (O'Curry's Lectures on the MS. Materials of Ancient Irish History, p. 466). The external evidence bearing on this question is as follows:—The tale of Baile and Ailinn is found in a MS. (Trin. Coll., Dublin, H. 3. 18) written

about the year 1511. I am not aware that any other copy of it exists. And allusions to the yew of Baile and the apple-tree of Ailinn are contained in two poems in the *Book of Leinster* (written about A. D. 1130). One of these is ascribed to Ailbhe, daughter of Cormac mac Art, who must have lived in the middle of the third century. The other poem is attributed to Flann mac Lonan, chief poet of Ireland, who died A. D. 918. But the poems do not mention the *taibhli*: so that we have no evidence confirming that part of the story as it is told in a MS. of the sixteenth century. This is not a sufficient foundation on which to rest an argument respecting the use of letters or Ogam in Ireland fifteen hundred years before. The romance of Baile and Ailinn may be an ancient one; but we cannot trust to it as supplying "evidence of the existence in Art's time of what was then believed to have been a very ancient book, and, of course, of the existence in and before Art's time, at least, of letters among the Pagan Gaedhils." Still less can we accept it as proving that wooden *tabulæ* existed at that period filled with long tales written in Ogam. Professor O'Curry indeed believed that the *taibhli filedh* were made of long flat pieces of wood which folded up like the parts of a fan, so as to form a substantial staff, and actually served as such. Here is what he says:—"In a very ancient article in the Brehon Laws, which prescribes the sort of weapon of defence which the different classes of society were allowed to carry on ordinary occasions to defend themselves against dogs, &c., in their usual walks, a passage occurs which throws some light on this subject. The article belongs to the Christian times, I should tell you, in its present form, as it prescribes a slender lath, or a graceful crook, for a priest, while it assigns to the poet a *Tabhall-lorg*, or tablet staff, in accordance with the privileges of his order, &c." Professor O'Curry goes on to state that *Tabhall-lorg* is only a

modernised or Latin-Gaethelic form of *tamh-lorg* (a headless staff), and quotes a passage from the *Agallamh na Seandrach* in support of his views. "Where are the seniors and Antiquaries of Erin? Let this be written in *Tamhler-gaibh Fileadh* (headless staves of Poets), and after the manner of professors, and in the language of the *Ollamh*, so that every one may take his copy (or share) with him to his own territory and land of all the knowledge, and all the history, and all the topography, and all the deeds of bravery and valour that Caeilté and Oisín have related. *And it was done accordingly.*"

I confess I do not believe that each of the Antiquaries of Erin was able to carry away all this learning in his walking-stick. And I am equally sceptical as to Professor O'Curry's etymology. I say this although I am aware that waxed tablets such as the Romans used might have been large enough to contain a considerable amount of writing. Dr. Todd has reminded us that in degenerate days, when a wholesome discipline was no longer kept up in schools, a pupil under seven years old would not hesitate to break the master's head with his writing table, if a hand was laid upon him.

At nunc priusquam septennis est, si attingas eum manu,
Extemplo puer paedagogo tabula dirumpit caput.

(Plaut., *Bacchid.* iii. 3, v. 36-7).

It may be rash to deny that the *tabhall-lorg* was something different from the *tabhall filedh*. But we must be slow to admit that long histories were written in Ogam characters on either one or the other. We have no trustworthy evidence of it.

If we may believe the testimony of one of the ancient writers who compiled the Acts of St. Patrick preserved in the *Book of Armagh*, wooden staves, bearing characters upon them, were in use in Ireland in the fifth century.

Patricius venit de campo *Arthicc* ad *Drummut* ¹*Cerigi*, et ad *Nainniu Toisciurt* ad *Ailech Esrachtæ*; et [cum] viderunt illum cum viris viii aut viiii cum tabulis in manibus scriptis more Moysaico exclamaverunt gentiles super illos ut Sanctos occiderent. Et dixerunt gladios in manibus habent ad occidendos homines: videntur lignei in die apud illos, sed ferreos gladios æstimamus ad effundendum sanguinem, &c. (*Book of Armagh*, fol. 9, a a).

Now it will be observed that the persons who bore these staves were Christian followers of St. Patrick, who came to Ireland attended by men of different nations—Romans, Britons, Gauls, and Lombards. And there is nothing in the narrative to indicate that the use of such staves on this occasion was uncommon. On the other hand, the natives in whose minds they created alarm were pagans, who would have expressed neither fear nor surprise if inscribed staves of this kind were in use amongst themselves. This is a testimony of great antiquity—the very MS. in which we find it was written in the year 807; and the fragmentary notices from which the passage is taken were collected by three persons of whom the latest died about the middle of the eighth century. Unless we pronounce the whole story to be a fabrication, we must accept it as an authority to prove that in the middle of the fifth century wooden staves, in form not unlike the short straight swords of the Irish, were used for writing on. And further, it indicates that the practice was brought into the country by Christian missionaries from other lands.

In the social state of ancient Ireland, there was nothing more interesting than the existence of a literary hierarchy, with its privileges and duties secured and defined by public law. The following passages, taken from Colgan, set before us the nature of this institution, with an authority which commands our respect, both on account of his acquaintance with ancient Irish documents, and because the knowledge of the laws and customs relating to this matter

was still kept up by tradition in the schools of learning which were not extinct in his time. Even then the study of Irish History, both civil and religious, was prosecuted with diligence, as Colgan notices, in certain families. In a note on the words *Druidæ isto sæculo* [*sæcto*] *in pretio habiti*, he says:—

Extiterunt Druidæ, quos acta nostrorum Sanctorum passim vocant Magos, non solum ante Christum natum in summa veneratione apud Hibernos, eodemque honore quo apud Gallos tempore Julii Cæsaris juxta quod de eis scribit idem Cæsar de Bello Gallico libro quinto; sed et a fide Hibernis prædicata usque ad annum fere septingentesimum, nisi et postea; ut constat ex actis S. Patricii, Kierani, Ailbei, Declani, Brigidæ, Moctei, aliorumque passim nostræ gentis Sanctorum. Et licet interea Druidæ in Christum credentes, auguria, vaticinia, incantationes, aliasque magicas professiones et artes abjuraverint, non destiterunt tamen eorum successores, nempe Seneciores et Poetæ, studium antiquitatis mirifice colere, scholis publicis præesse, et hic in summo pretio apud proceres et populum haberi. Vide quæ de tribus generibus horum Antiquariorum alibi adnotamus: quorum primum Jurisperitorum erat, et leges et constitutiones patrias observabat, lites omnes de finibus agrorum, de prærogativis familiarum, de contractibus aliisque patriæ juribus et prærogativis dirimebat. Secundum Seneciorum ut vocant, sive Antiquariorum, qui Regum, Principum et procerum acta, horumque ac nobilium familiarum genealogias scribebant et observabant: vocumque Hibernicarum origines, derivationes, flexiones, aliasque patrii idiomatis antiquitates sedulo observabant. Tertium erat Poetarum qui procerum acta et laudes versibus varii generis celebrabant. Sed de singulis alibi fusius.—Colgan, AA. SS. p. 149, n. 15.

These last words refer, I believe, to the following passage which occurs in the life of St. Onchu:—

Sub sæculi sexti medium floruit in Hibernia vir sanctus nomine Onchuo. Is honesto loco in partibus Connaciæ de genere natus est Antiquariorum, qui apud Hibernicam gentem, suæ antiquitatis

retinendæ atque ad posteros transmittendæ perquam zelosam studiosamque, in magno semper honore et veneratione extiterunt. Erant namque ab initio, inter Hibernos, et ad nostros usque dies manserunt, certæ quædam et determinatæ familiæ quibus incumbibat cura veteres regni leges, illustrium virorum præclara gesta, genealogias, aliasque tam sacras quam profanas patriæ antiquitates observandi et apprime sciendi. Hujusmodi autem rei antiquariæ studium sæculis proxime superioribus in tres erat divisum facultates, quæ omnes olim fortasse penes easdem personas residebant. Prima erat juridica, cujus erat non solum scire regum sanctiones, ac vetustas patriæ leges, sed et in obortis litibus et causis, ad earum normam decisivam ferre sententiam. Secunda historica, quæ scire debebat et observare patriæ historias, nobilium genealogias, privilegia, aliaque id genus ad antiquitatis studium pertinentia. Tertia poetica et grammatica, cui munus incumbebat observandi vocum flexiones, et declinationes, componendique omnis generis carmina. Nec erat in toto regno princeps vel familia illustris, quæ non habebat harum facultatum professores aliquot sibi peculiare et proprios, qui ultra communes regni antiquitates, proprias ejus domus et familiæ ex officio callere, et minutius observare debebant. Ex hujusmodi ergo professoribus erant pater et majores S. Onchuonis; ipseque paternum sectatus institutum ad avitas traditiones fideliter addiscendas animum a juventute applicuit, tantumque profecit, ut in ea professione peritissimus Magister evaserit.—Colgan, AA. SS. p. 276, c. 1.

In pagan times, the Druids combined in their own persons all the functions of priests, philosophers, and poets, and therefore held in the State a place with which great power and important privileges were connected. But it seems probable that when Christianity was established in Ireland the Druids were conciliated, or at least their opposition was neutralised, by giving to their order an establishment similar to, and co-ordinate with, that which was provided for the ministers of the Christian Church. Pagan rites were suppressed; religious functions were committed to the Christian ecclesiastics; and the duties of exercising judicature, promoting letters, and keeping the public re-

ords, was entrusted to the order of poets. In process of time, the parallelism between the two hierarchies became complete. As the Medieval Church had its seven orders, so there were seven grades of poets—The Ollamh, the Ard Ollamh, the Cli, the Cana, the Dos, the Mac Fuirmidh, and the Fochlach. And the laws prescribed the course of study which they were required to master.

The learned have divided the Gaedhelic writings into four classes, and these are their names:—

I. *Senchus Mor*, and *Breatha Nemeadh*, *Ai Chearmna*, and *Al Chana* form the first: and *CANOIN* is the name of this division, because of the greatness of the knowledge and explanations these writings contain.

II. The thrice fifty Ogams, and the *Remenda*, i. e., *Rem nam*, and the *Duille Feadha*, and what appertains to them, constitute the second division. *GRAMIDACH* is its name, because of the greatness of its good knowledge: for correct speech is a search for knowledge.

III. The Feasts, and the Reliefs, and the Destructions, and the thrice thirty Tales, and the three score subordinate Tales, together with what appertains to them, constitute the third division, which is called *STAIR*, because narratives and acts are related in it.

IV. *Bretha Cai* (the judgments of Cai), with their supplements form the fourth division; and *RIM* (Enumeration) is its name.—(*Book of Lecan*, fol. 259, bb.)

An acquaintance with the whole of this extensive course of study was required from the Ollamh; and we learn from a tract on the names, qualifications, and privileges of the seven degrees of poets that the Fochlach, a member of the seventh or lowest order, “learned in the first year fifty Ogams, and *Uraicept na h-Eicsin*, with its preface and its *Remenda*, and ten *Dreachts*, and six *Dians*, thirty Tales, &c.”—(MS. in T. C. D., H. 2. 15, p. 80.)

Thus we have traced the Ogam into the possession of the literary class, as a branch of the learning which they

are legally bound to profess. So far then we have verified the statement quoted above from M'Curtin. And when we remember how many proofs these poets gave of their competence for what was obscure and occult, it seems quite credible that they used the Ogam for cryptic purposes. The *disputation of the two Sages* furnishes a notable example of their desire to keep to themselves a monopoly of their learning, such as it was.

More and more obscure to the people were the words in which these two Filés discussed and decided their dispute, nor could the kings or the other Filés understand them. Conor and the other princes at that time present at Emania said that the disputation and decision could be understood only by the two parties themselves, for that they did not understand them.—(*Book of Ballymote*, fol. 142 bb.)

The poets are said to have been deprived on that occasion of functions which they had previously possessed; and the commentator on the *Senchus Mor* tells us that, in the revision of the laws effected in the time of St. Patrick their functions were again limited and defined.

Patrick abolished these three things among the poets when they believed, as they were profane rites, for the *Teinm Laegha* and *Imus Forosna* could not be performed by them without offering to idol gods. He did not leave them after this any rite in which offering should be made to the devil, for their profession was pure. And he left them after this extemporaneous recital, because it was acquired through great knowledge and application; and [also the registering of] the genealogies of the men of Erin, and the technical rules of poetry, and the *Duili Sloinnté*, and *Duili Fedha*, and storytelling with lays.—(*Senchus Mor*, vol. i., p. 45.)

The *Fedha* here mentioned were the *Beithluisnin*; and the *Duili Fedha* seem to have been a portion of the *Fraicept*, or some other treatise on Ogam.

The *Book of Leinster*, written about the year 1130, con-

tains a short paragraph, in which is given a complete Beithluisnin, including the Forfedha, together with rules as to the use of the latter characters in words containing diphthongs and triphthongs. This passage has little interest beyond what is connected with the fact that it is the most ancient manuscript authority which has come down to us on the subject of Ogamic orthography. The Ogam marginal notes in the *St. Gall Priscian* were written, as I think I have proved [*Proceedings of the Royal Irish Academy*, vol. vi., p. 199], in the year 874. But there is at the end of the Gospel of St. John, in one of the Stowe MSS., a single word in Ogam, which I read as DINOS, and which, I suspect, is the *Ogam name* of the scribe Dimma Macc Nathi, who wrote the copy of the Gospels in the Trin Coll. Dublin MSS., known as the *Book of Dimma*. This signature of DINOS is by far the oldest specimen of manuscript Ogam which is known to exist, if we are right in believing that the *Book of Dimma* was written for St. Cronan of Roscrea, who died in the year 620; and that if DINOS is not the Ogam equivalent of Dimma, the two MSS. were written about the same time, as the handwritings seem to prove. On this latter point I am not able to pronounce a confident opinion, as I can only refer to the fac-simile of a page of the MS. given in O'Connor's *Rerum Hibernicarum Scriptores*. The colophon to which I refer is as follows:—

Rogo quicumque hunc librum legeris ut memineris mei peccatoris scriptoris, *i. e.*, SONID (in Ogam characters) peregrinus Amen. Sanus sit qui scripsit et cui scriptum est Amen. The writer was a peccator, guilty of some crime for which he was doing penance in a pilgrimage, and this may have been the reason why his signature is presented under the double veil of a backward-written Ogam. It is true that scribes delighted to show their learning by writing colophons in Greek, Runic, and other characters differing from those used in the transcript which

they made. But it must be admitted the explanation first offered is by no means an improbable one.

In what precedes I think I have succeeded in showing from ancient Irish documents, that the Ogam was regarded by their authors as a cryptic character, the art of reading and writing which was an acquirement confined to persons who possessed peculiar qualifications, personal or professional, such as accomplished knights or men of learning. I argue, moreover, that its alleged use for the superstitious purposes of divination and incantation is in accordance with the notion that it was something occult and mysterious. And I have adduced reasons for the belief that the *Ogam names* inscribed on monuments were different in form from the ordinary names of the persons commemorated. In executing my task I have fairly set before the reader the passages which appeared to me to contain statements or allusions tending to elucidate the subject which I had in hand. I have left a few unnoticed, which were identical in substance with others which I have quoted; but I have kept back nothing that was doubtful or at variance with my own views. In dealing with the Irish texts, I have used translations made for me five-and-twenty years ago by Professor O'Curry. As he knew my opinion with respect to the antiquity of the Ogam to be different from his own, he would not have failed to confront me with facts and testimonies overthrowing my theories, had he been himself possessed of any such materials. If an examination of our manuscripts or monuments should open up fresh sources of information, I shall welcome the discoveries which scholars may thus be enabled to make, whether they are consistent with or opposed to the conclusions put forward in this Paper. I do not expect to find that we have Ogam monuments belonging to the centuries B. C. But I am sanguine enough to believe that the deciphering of our Ogam

inscriptions will furnish results of considerable importance, confirming portions of our history which have hitherto remained without that kind of attestation which is supplied by monuments and coins.

C. LIMERICK.

NOTE ON SCYTHIAN LETTERS.

If any one imagines that the story of Fenius Fearsaidh and his philological school in the plain of Shinar must contain some elements of truth in it, because we find it told in ancient Irish MSS., he may be asked to consider the following passage, in which an Irish antiquary, writing several hundred years ago, professes to give an account of the origin of the names of the notes in the musical scale.

"It is asked here, according to Saint Augustine, What is chanting, or why is it so called? Answer. From this word *cantallena*; and *cantallena* is the same thing as *lenis cantus*, i. e. a soft, sweet chant to God, and to the Virgin Mary, and to all the Saints. And the reason why the word *puince* (*puncta*) is so called is because the points (or musical notes) *ut, re, mi, fa, sol, la*, hurt the devil and puncture him. And it is thus that these points are to be understood: *viz.*, When Moses the son of Amram with his people in their Exodus was crossing the Red Sea, and Pharaoh and his host were following him, this was the chant which Moses had to protect him from Pharaoh and his host—these six points in praise of the Lord:—

"The first point of these, i. e. *ut*: and *ut* in the Greek is the same as *liberat* in the Latin; and that is the same as *saer* in the Gaelic; i. e. O God, said Moses, deliver us from the harm of the Devil.

"The second point of them, i. e. *re*: and *re* is the same as *saer*; i. e. O God, deliver us from everything hurtful and malignant.

"The third point, i. e. *mi*: and *mi* in the Greek is the same as *militum* in the Latin; and that is the same as *ridere* (a knight) in the Gaelic; i. e. O God, said Moses, deliver us from those knights who are pursuing us.

"The fourth point, i. e. *fa*: and *fa* in the Greek is the same as *famulus* in the Latin; and that is the same as *mug* (slave) in the Gaelic; i. e. O God, said Moses, deliver us from those slaves who are pursuing us.

"The fifth point, i. e. *sol*: and *sol* is the same as *grian* (sun); and that is the same as righteousness; because righteousness and Christ are not different; i. e. O Christ, said Moses, deliver us.

"The sixth point, i. e. *la*, is the same as *lav*, and that is the same as *indail* (wash); i. e. O God, said Moses, wash away our sins from us.

"And on the singing of that laud Pharaoh and his host were drowned.

"Understand, O man, that in whatever place this laud, i. e. this chant, is sung, the Devil is bound by it, and his power is extirpated thence, and the power of God is called in."

This is very absurd; perhaps the more so as we see no indication that the writer intended to perpetrate an elaborate *jeu d'esprit*. He must have known, if he had any acquaintance with Greek and Latin, that the alleged derivations were incorrect. But probably he was no scholar; and, being ignorant of the true origin of the names of the notes, he may have thought that his etymologies, such as they were, would be as acceptable as any better ones to the still more ignorant students for whose benefit he was drawing up this catechetical treatise. We have been taught that the names of the first six notes in the gamut were suggested by the initial syllables of the first six hemistichs in one of the stanzas of a hymn to St. John.

Ut queant laxis
Resonare fibris
Mira gestorum
Famuli tuorum,
Solve polluti
Labii reatum,
 Sancte Ioannes.

By way of completing this explanation I venture to

suggest that the name of the seventh note in the scale was formed by combining the initial letters of the two words in the last line of the Sapphic stanza.

This may be regarded as a curious specimen of mediæval Irish etymological speculation. It is that, and something more. It is an instructive example showing that our ancient *Senchaidhs* sometimes ventured to use their powers of invention with great freedom, even when they were professing to give a systematic account of *Origines*. But in such cases they did not trust entirely to imagination. Ideas taken from the Bible, Homer, Virgil, and other ancient writings, very commonly suggested or formed the basis of their fictions.

The story of Fenius Fearsaidhe is a mere figment; and we may safely pronounce the same judgment on much of what we read in the *Leabhar Gabhala*. And yet, as ancient Irish writers agree in claiming for their progenitors a Scythian origin, it is only reasonable to inquire what knowledge of letters existed among the people of that race. Herodotus does not state that they had letters: but he mentions that they practised a kind of divination by means of twigs. It is at least probable that these twigs either represented letters, or had letters marked upon them. It is not otherwise easy to conceive how the casting of such lots could furnish prognostics. This is only a conjecture; but we have good warrant for it. Cicero, speaking of the *Sortes Prænestinæ*, explains them as *Sortes in robore, insculptæ præscarum literarum notis* (*De Div.* ii. 41). Cæsar uses the same term *sortes*, to denote a similar practice amongst the Germans. (*De Bello Gallico*, lib. ii. cap. 53.)

According to Tacitus, who explains the nature of these *sortes* more particularly, the twigs or staves used for this purpose bore certain marks. *Virgam frugiferæ arboris decisam, in surculos amputant, eosque, notis quibusdam discretos, super candidam vestem temere ac fortuito spargunt* (*Germ.* c. 10).

So again, Ammianus Marcellinus tells us of the Alani, "*Futura miro præsagiunt modo. Nam rectiores virgas vimineas colligentes, easque cum incantamentis quibusdam secretis præstituto tempore discernentes, aperte quid portendatur norunt*" (cap. xxxi. § 2, 24).

The Scandinavians also practised a method of divination by throwing runes, as it was called. This was done by dipping bunches of twigs, or chips, into the blood of sacrifice and shaking them (see Articles on *hlaut* and *hlaut-vidr*, in Cleasby's Icelandic Dictionary). If Dani and Gothi are related etymologically and ethnologically to Daci and Getæ, this custom may be traced to a Scythic source.

It is only a hypothetical inference that we are entitled to draw, when we consider the power manifested by the Scythians when they invaded Media, more than six centuries B. C. The Medes had then the use of letters. That fact furnishes a presumption, though not a strong one, that their neighbours enjoyed advantages of the same kind. An illiterate nation would experience a serious disadvantage in all its transactions, whether in peace or war, when it had to deal with a neighbouring State possessing letters.

Besides the dearth of information which we experience in conducting this inquiry, we meet with another cause of difficulty and uncertainty; for the name of Scythian has been applied to nations occupying countries very remote from one another. But the people of that name with whom the Irish might, with most show of reason, claim relationship, seem to have occupied parts of Europe to the North and West of the Black Sea, along both sides of the Danube, and Northwards to the Baltic, on the Eastern bank of the Vistula. Of the use of letters amongst people in these regions we know little. Races, however barbarous, in contact with the Greeks and Romans, can hardly have helped learning from them the use of letters. Nor is it to be conceived that such men as Anacharsis, the friend of

Solon, and Zalmoxis, to whom the Thracians paid divine honours on account of his learning and virtues, and Zeutas, and Diceneus, and Toxaris, could have failed to introduce among their countrymen so essential an element of civilization. Thus, as there were philosophers, one may say there must have been letters amongst those Western Scythians, whom the Irish Chroniclers call the Greeks of Scythia, for centuries before the Christian era. But we are straying again into the field of conjecture, and must come down to the third or fourth century for anything like positive information on this subject.

The *Cosmographia* of Æthicus gives us incidentally some information regarding the use of letters in these regions. He was a learned Scythian, who is supposed to have flourished towards the close of the third century, and who travelled about the world, not only collecting information, but taking such opportunities as offered themselves of displaying his own erudition and ingenuity. Brought into intercourse with the learned men of Greece, he entered into literary competitions, the strange nature of which is indicated by the following passage :—

“ *Ipsum quoque carmen talibus characteribus distinxit ut nullus hominum legere vel disserere nodos possit. Ebræos characteres resupinatos, Grecos incurvatos, Latinos duplicatos in similitudinem circi, suosque apices in medium positos, metrico more compositos, sua laude sibimet solus sciebat. Qua in re in omni Grecia diversi interpretes qui tunc celebres variis problemis dissolvebantur artem ipsius et adinventionem necnon propositionem enucleare non valuerunt.*” (Conf. Edit. Wuttke, p. 56.)

Here we recognise the working of that spirit which manifested itself generally among those to whom the use of alphabetic writing was new. To them all writing seemed something supernatural. The very letters themselves, their names and shapes, were mysteries, and thus alphabet-making became a practice; as if a great deal depended

upon the nature of the character employed. The alphabet of Æthicus has been handed down to us at the end of the Latin epitome of his *Cosmographia*, made, as is alleged, by St. Jerome from the Greek original. In this curious work we are told that Æthicus visited Ireland:—

“Hiberniam properavit et in ea aliquandiu commoratus est eorum volumina volvens. Appellavitque eos idiomochos vel idiotistas, id est imperitos laboratores, vel incultos doctores. Pro nichilo namque eos ducens ait: Mundi fines terminare, et Hiberniam pervenire, onerosus labor est; sed nulla facultas. Horrorem nimium incutit, sed ad utilitatem non proficit. Imperitos enim habet cultores.” (Conf. Edit. Wuttke, p. 14.)

It appears then, from his use of the word *volumina*, that although he gives the Irish of his time little credit for learning or civilisation, he found them possessed of books written in a character which he could read. Perhaps we may attach some weight to his testimony as to this matter of fact, though the writer, whoever he was, who took the pains to make a translation of his work, admits that some of his stories went beyond the bounds of credibility:—

“Multa quidam et alia difficilia in enigmatibus suis scripsit de his insulis (Orcadibus et Betoriticis) quæ a nobis incerta vel dubia retinentur. In Munitia insula septentrionali scribit homines cenocephalos, quos nimis famosa indagatione scrutans capita eorum capitis canini habere similitudinem repperit. Reliqua membra humana specie, manus et pedes sicut reliquum hominum genus, procera statura, truculenta species, monstra quoque inaudita inter eos, quos vicinæ gentes circa eos Cananeos appellant.” (Conf. Edit. Wuttke, p. 14.)

It is hard to believe that St. Jerome could have written such barbarous Latin as we find in the translation of Æthicus here referred to. And Semler long ago condemned the work as “*barbare scriptum*,” “*nugis et fabulis refertum*,” “*omnia indigna Hieronymo tradere de creatione mundi; ac ne Æthici quidem esse, quoniam in eo libro ipse Æthicus*

Ister Philosophus sæpe citatur et Alchimus" (Fabricius *Biblioth. Lat.* 1, cap. 10, § 11).

Nevertheless Rabanus Maurus ascribes it without hesitation to St. Jerome:—

" Literas etiam Æthici Philosophi Cosmographi, natione Scythica, nobili prosapia, invenimus, quas venerabilis Hieronymus Presbyter ad nos usque cum suis dictis explanando perduxit, quia magnifice ipsius scientiam atque industriam duxit. Ideo et ejus literas maluit promulgare." (Rabani Mauri Op. vol. vi. p. 333.)

And Wuttke has maintained the same view with so much learning and ingenuity, that we cannot deny to the work the authority and antiquity which make its testimony of value to us in the present investigation. The extracts made from it have been copied from the MS. D. 1. 26. in the Library of Trinity College, Dublin, which exhibits a text less corrupt than that which has been printed by Wuttke from a Leipsic MS. It also presents headings and marginal notes, which show that it was accepted by the transcriber as the work of St. Jerome.

The Hungarian Chronicle supplies us with some further information respecting Scythian letters. The followers of Chaba, son of Attila, escaping from a sanguinary battle, in which they had suffered a total defeat, established themselves in that district of the ancient Dacia which is now called Transylvania. There, desirous to conceal the fact that they were a remnant of the Hunns, they assumed the name of Siculi (Zekler), and kept up for a long while the customs in which they differed from the rest of the Hunns. They lived without distinctions of rank; all claiming the equal rights of freeborn citizens. Their manners were austere; and their laws respecting the distribution of land were peculiar. *Hi, nondum Scythicarum literarum obliti, eisdem non encausti et papyri ministerio sed in baculorum excisionis (incisionis?) artificio, dicarum ad instar, utuntur* (Thwrozius Chron. Hung. cap. 24). Bonfinius, speaking of

the Siculi, says :—*Literas Scythicas habent quas non in papyro scribunt sed brevissimo ligno excidunt, paucis notis multum sensum comprehendentes* (Bonfinius. Decad I. lib. vii.) Nicolaus Olahus, in his life of Attila, gives us some fuller information about this practice. *Ad explicandam animi sententiam ac voluntatem quotidianam, præter usum papyri et atramenti, aut characteres aliarum linguarum, notas quasdam bacillis ligneis incidunt, aliquid inter se significantes, quibus ita incisis, apud amicos et vicinos vice nuntii epistolæ utuntur.*—(In Bonfinii Rer. Hung. Decad. p. 889.)

This passage conveys the idea that the Zeklers, though acquainted with the use of pen and ink, and such letters as were used by other nations, employed these Scythian characters, cut upon wooden tallies, as ciphers for the purpose of private communication. Gibbon, indeed, speaks lightly of the authority of these chroniclers. He says that Thwrozius collected fables which were afterwards embellished by Bonfinius. But he admits that the rude annalist, whose older work furnished them both with materials, must have transcribed some historical records, since he could affirm with dignity that the *fabulæ rusticorum et garrulus cantus jocularum* had been rejected by him.

Menänder, in his account of the Embassy sent by the Turks to the Emperor Justinian, makes mention of τὸ γράμμα τὸ Σκυθικόν. But he does not tell us of what kind it was. This was so late as the latter part of the sixth century. (Eclogæ Legationum § 7 in Corp. Script. Hist. Byzant).

The reader who happens to have consulted the article on "Tabulæ" in Smith's *Dictionary of Antiquities* may suspect me of having overlooked the triptychs there mentioned, which are said to have been found in a gold mine in Transylvania. One of them is described as presenting some Greek writing, along with some unknown characters. Considering where the triptychs were found, and their

date—for if they were genuine they must have been in use in the year 169—we might conjecture that these characters were Scythian, and turn with curiosity to the work in which they have been described and figured by M. Massmann. But our attention would be misdirected. M. Champollion has shown in his *Palæographie* that the triptychs are forged.

These fragmentary notices of Scythian writing furnish us with no materials from which we can derive a positive and complete answer to the question which we have proposed. But they may be regarded as rendering it probable that the Scythians, and those of them especially who lived in the countries bordering on the lower Danube, had the use of letters at a very remote period. And this might be maintained even though it were true that Ulphilas had constructed the alphabet employed in the Version of the Gospels which he made for the Mæsogoths in the fourth century. It was, in the main, a Greco-Latin one, with some Runic elements introduced into it. The Scythian characters mentioned in the passages which I have quoted were wholly different in their nature and use. They were ciphers (*notæ*), certainly cryptic, and perhaps stenographic.

C. LIMERICK.

MISCELLANEA CRITICA.

SOPHOCLES, *Oed. R.*, 22.

Πόλις γὰρ, ὥσπερ καὶ τὸς εἰσορᾶς ἄγαν,
ἤδη σαλεύει κἀνακουφίσαι κἀρα
βυθῶν ἔτ' οὐχ οἷά τε φοινίου σάλου.

I THINK that the above punctuation, which joins ἄγαν to εἰσορᾶς instead of σαλεύει, is possible: 'as you see only too well.' Σαλεύω is strong enough without having ἄγαν joined to it, and so we find in Eur. *Rhes.*, 249, ὅταν ᾗ δυσάλιον ἐν πελάγει καὶ σαλεύῃ πόλις, without ἄγαν. Moreover, ἄγαν is very well joined to εἰσορᾶς; Liddell and Scott say it is sometimes "strongly affirmative, like Lat. *prorsus*, too surely. Aesch. *Theb.*, 811," which reference is:

οὕτως ἀδελφαῖς χερσὶν ἡναίροντ' ἄγαν,

'only too truly.' Again, cf. Soph. *Aj.*, 942:—

σοὶ μὲν δοκεῖν ταῦτ' ἔστ', ἔμοι δ' ἄγαν φρονεῖν.

Compare also the corresponding use of λίαν, Aesch. *Prom.*, 1052:—

ὥς ὅδ' οὐ πεπλασμένος,
ὁ κόμπος ἀλλὰ καὶ λίαν εἰρημένος.

Oed. Col., 707.

ἄλλον δ' αἶνον ἔχω ματροπόλει τᾷδε κράτιστον
δῶρον τοῦ μεγάλου δαίμονος εἰπεῖν [χθονὸς] αὔχημα μέγιστον.

Χθονὸς, omitted in the MSS., is supplied by Porson to suit the strophe. But χθονὸς could scarcely have fallen

out. More likely ἐμὸν is the true reading after ἔχω, and the emphatic first person in the strophe: ἔστιν δ' οἷον ἐγὼ γὰρ Ἀσίας οὐκ ἐπακούω.

EURIPIDES, *Bacchae*, 778.

Ἦδη τόδ' ἐγγὺς ὥστε πῦρ ἐφάπτεται

ὑβρισμα βακχῶν.

I do not think that ἐφάπτεται means "is brought home to me" (Paley), or "kindled," or that there is any necessity to change it to ὑφάπτεται (Tyrrell). The line means: "This insolence of the Bacchants is spreading like a fire, and coming close to us": ἐφάπτεται 'is catching,' 'laying hold of' what is next to it. The contagion had, in Pentheus' opinion, reached the chorus, who had just boldly expressed their reverence for Dionysus in outspoken language.

Bacchae, 1037.

Θήβας δ' ἀνάνδρους ὧδ' ἄγεις * * *

The omitted portion of the line, supposing it to have been a trimeter iambic, may well have been ἀγήνορας—thus a happy implied answer to the charge of cowardice in ἀνάνδρους would be supplied; 'do you consider manly Thebes is so unmanly?' with an allusion to Agenor, father of Cadmus; or possibly 'Αγήνορος itself may be right. Carthage is called the city of Agenor by Virgil, and Thebes has an equal right to the appellation.

Bacchae, 1298.

AT. Διόνυσος ἡμᾶς ὤλεσ' ἄρτι μανθάνω.

KA. ὑβριν ὑβρισθεῖς. θεὸν γὰρ οὐχ ἡγείσθ' ἐνιν.

So the MSS. ὑβριν γ' ὑβρισθεῖς, Tyrrell after Heath.

ὕμῳ, Nauck after Hermann. ὕβρεις, Brunck. I suggest ὕβρισεν ὕβρισθείς, or ὕβριζ' ὕβρισθείς: 'he returned insult for insult.' This would be like Aesch., *Prom.*, 991:—

οὕτως ὕβρίζειν τοὺς ὕβρίζοντας χρεών,

'Insolence is due to the insolent.'

ARISTOPHANES, *Pax*, 605.

Πρῶτα μὲν γὰρ ἤρξεν ἄτης Φειδίας πράξας κακῶς·
εἶτα Περικλῆς φοβηθεὶς μὴ μετὰσχοι τῆς τύχης,
τὰς φύσεις ὕμῳ δεδοικῶς καὶ τὸν αὐτοδᾶξ τρόπον,
πρὶν παθεῖν τι δεινόν, αὐτὸς ἐξέφλεξε τὴν πόλιν
ἐμβالὼν σπινθῆρα μικρὸν Μεγαρικῷ ψηφίσματος,
κἀεφύσησεν τοσοῦτον πόλεμον ὥστε τῷ καπνῷ
πάντας Ἑλλήνας δακρύσαι, τοὺς τ' ἐκεῖ τοὺς τ' ἐνθάδε.

In the first line, ἤρξεν ἄτης is a conjectural reading of Siedler, pretty nearly universally adopted. The MSS. give αὐτῆς ἤρξεν, and so does Diodorus Siculus in his quotation of the passage, xii., 40; presenting a spondee in the third foot. Now, I do not believe in the correction ἤρξεν ἄτης. It does not account for the fact that αὐτῆς precedes ἤρξεν in the MSS. The copyist may have had this before his eyes—

Πρῶτα μὲν γὰρ ΗΡΞΑΥΤΗC Φειδίας πράξας κακῶς.

The verse appeared to him a syllable short, and so he adopted the easy expedient of inverting the order of the two words, thus gaining a syllable in ἤρξεν or ἤρξε. But the line was not a syllable short, for ΑΥΤΗC is not αὐτῆς, but αὐτῆς in my opinion, and the line should run:—

Πρῶτα μὲν γὰρ ἤρξε' αὐτῆς Φειδίας πράξας κακῶς,

'Phidias raised the war-cry first.' Our knowledge of the downfall of Phidias is very imperfect; but how that downfall could by itself have contributed to bring about the woes of the Peloponnesian war would be a positive mystery. His connexion with Pericles would account for

it; but *that* is here separately stated (εἴτα). Phidias, in disgrace, would naturally appeal to his Peloponnesian friends, the Eleans and others. Paley's suggestion ἡρξε is, however, not improbable.

DEMOSTHENES, *De Fals. Leg.* 400.

ὡς εἰδῆθ' ὅτι τὸ ψυχρὸν τοῦτο ὄνομα τὸ ἄχρι κόρου παρελήλυθ' ἐπὶ φενακίζων ὑμᾶς.

The difficulty of this passage is well known, and the explanations are unsatisfactory. Shilleto's is this: Philip had talked much of being the benefactor of the Athenians, and had used the name 'Ευεργέτης so often that it was sickening to hear it. He translates παρελήλυθε, 'he has overshot [*and thereby lost*].' The word could not possibly mean 'he has lost,' in my opinion; 'he has overshot' and 'he has lost' are far from being convertible expressions. They are not the least like each other. Further, there has been no allusion to Philip's having talked of being the benefactor of the Athenians, and if Demosthenes intended 'Ευεργέτης by the ὄνομα ἄχρι κόρου, I don't think he would have been understood. I think the interpretation adopted by Whiston, though more plausible, is also unsound—'has gone beyond that frigid expression "usque ad nauseam" in his cheating of you.' Ὄνομα can hardly mean 'an expression' or 'saying.' And there was no particular point in ἄχρι κόρου. There would be if φενακίζειν ἄχρι κόρου, or anything like it, were a common expression, but it is not.

The meaning of the passage, I am pretty confident, is this: 'that you may know that Philip has gone far beyond that frigid name, which I'm sick of saying, and you are sick of hearing, in his cheating of you.' What frigid name? Simply φέναξ; simply *cheat*. The orator had intended to finish his sentence with πεφενάκειν or φέναιον διατελεῖ, or something of that sort; but in a burst of in-

dignation at the long succession of acts of deception and villainy practised by Philip and the ambassadors, the stale expression he has used so often becomes frigid and inadequate. He has used the word *φενακίζω* or *φενακισμός* *eleven times* in this speech of the deceptions of Aeschines and Philip—quite often enough to justify the expression *ἄχρὶ κόρου*, to say nothing of the number of times he applies the same expressions to Philip in his Olynthian and Philippic orations.

CICERO, *Cat.* I., 6.

Praetermitto ruinas fortunarum tuarum, quas omnes impendere tibi proximis Idibus senties.

This is a very absurd reading. What point has ‘omnes’ agreeing with ‘ruinas’? And Catiline would not find his ruin *impending* on the Ides. It was already impending; he would feel the crash itself at the Ides, when unable to pay his bills. Besides, the repetition of *tibi* after *tuarum* is unnecessary. Read:—

Quas OMNES impendere, TU proximis Idibus senties,

“which *all men* know *is* impending, and which *you* shall feel at the Ides.” ‘Sentiant’ is to be supplied before ‘impendere’ out of ‘senties.’ Everyone was talking of Catiline’s approaching bankruptcy, and the stolid rake would find his own eyes opened very soon.

TACITUS, *Annals*, XI., 23.

. . . oppleturos omnia divites illos, quorum avi proavique hostilium nationum duces exercitus nostros ferro vique ceciderint, divum Iulium apud Alesiam obsederint. Recentia haec: quid si memoria eorum oreretur qui Capitolio et ara Romana manibus eorundem per se satis . . . fruerentur sane vocabulo civitatis.

All the emendations of this passage are eminently un-
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satisfactory. All, as far as I am aware, suppose 'manibus' to come from 'manus.' To me it seems certain that it is the dative of 'manes.' Cf. Liv., xxii. 6: "Iam ego hanc victimam *manibus* peremptorum foede civium dabo." I propose, then, simply to read 'fecerint' after 'satis'; 'fecerint' would drop out before 'fruerentur.' The meaning of the passage then will be something of this sort. "What! admit to the senate men whose grandsires had cut our armies to pieces! and, to go back to more distant times, whose ancestors had been cut to pieces by Camillus in the Capitol, and before the altar of Rome, and so rendered sufficient atonement to the manes of our armies aforesaid." It may be remarked, and justly, that it is very extraordinary to talk of offering atonement to the manes of posterity; but this absurdity seems to me to be guarded against by the expression *per se*: the slaughter of the Gauls by Camillus rendered any posthumous act of retribution to the manes of the Roman armies unnecessary. We have 'Sorani manibus satisfactum' in Tac. *Hist.* iv. 40.

PROPERTIUS, III. (IV.), vii. 60.

Quo rapitis miseros primae lanuginis annos?
Attulimus longas in freta vestra manus.

I regret having suspected the second of these lines of unsoundness. It has no external marks of corruption, and more careful consideration has convinced me that it is thoroughly Propertian, being a somewhat rough continuation of the idea of the first line, namely, the delicate youth of Paetus. That long taper hands are a characteristic of youth strikes some observers more than others, and I have met with the following coincident passage in an English author:—

"Here, as Lord Kendal sat on the hill-top, the whole scene came back to him, as it had not done for years. The hill-side, the

raw, misty rain, the roar of the conflict, the boy's bright curls, his curious national dress, his blue eyes, *his long white hands* as he had unfastened the cross from his cap." . . . [Véra, *A Novel*, p. 226.]

The interpretations of the commentators are truly absurd.

III. (IV.), xvi. 29.

Here the texts vary between—

Aut humet ignotae cumulus vallatus arenac,
and
Aut humer, ignotae cumulis vallatus arenae.

As the Naples MS. gives *humeri*, I have no doubt, independently of other considerations, that *humer* is the right reading.

But the line undoubtedly is—

Aut humer, ignotae cumulus vallatus arenae.

For when a body is buried there are no cumuli; there is but one cumulus. And it is in Propertius' manner to represent his grave or monument as himself—as all that shall be left of himself. Cf. II., i. 72 :—

Et breve in exiguo marmore nomen ero ;

and II., xiii. 35 [III., iv. 35] :—

. . . qui nunc iacet horrida pulvis.

II., xv. 16, 17 [III., vi. 16, 17].

Nudus et Endymion Phoebi cepisse sororem
Dicitur, et nudaе concubuisse deae.

In these verses, and those immediately preceding, the poet insists on nudity as essential to captivity. Helen was nude when she captivated Paris; Endymion was nude when he captivated Diana. But what of *nudaе*? It is out of place, and leads the mind astray from the poet's argu-

ment. It is a corruption owing to proximity. The MSS. of Propertius swarm with corruptions of this class. The true reading is *nitidae*. The shining goddess, the moon was captivated by the sight of Endymion as he lay asleep naked on the mountain. Phoebus is called the shining god, Ov., *Fast.*, III., 44 :—

Restabant nitido iam duo signa deo.

II., vi. 32.

Ah gemat, in terris ista qui protulit arte
Iurgia sub tacita condita laetitia.

I should like to see a rational interpretation of the passage, as it stands. Read *Orgia*, a neglected con- of Ruhnken, and one which I made independently there will be no difficulty.

II., xxxii. 35 [III., xxiv. 35].

Tyndaris externo patriam mutavit amore
Et sine decreto viva reducta domum est.
Ipsa Venus quamvis corrupta libidine Martis
Non minus in coelo semper honesta fuit.
Quamvis Ida Parim pastorem dicat amasse
Atque inter pecudes accubuisse deam.
Hoc et Hamadryadum spectavit turba sororum
Silenique senes, et pater ipse chori,
Cum quibus Idaeo legisti poma sub antro
Supposita excipiens Naica dona manu.

There is a great difficulty here. The last lines read plainly as lines can speak to the loves of Oenone and Paris. But Oenone is not mentioned. Attend to what the poet's argument should be :—I am not too severe a mother to Cynthia : I think of Helen and her foreign lover,

and Mars, Oenone and her shepherd. What in the world is the meaning of 'quamvis,' then, in the 5th line, carrying on the mention of Venus, and giving a legend unrecorded elsewhere, of Venus' love for Paris on Mount Ida, a history which belongs to Oenone, and Oenone alone, and mixing up in inextricable confusion this affair of Venus and Paris, with the following lines, in which the common story of Oenone and Paris is referred to? Led, therefore, by two reasons—first, suspicion of *quamvis*; secondly, the belief that Oenone must be brought into the verse,—I suggest that the line once ran thus:

Pegasida Ida Parim pastorem dicat amasse.

Cf. "Pegasis Oenone," *Ov., Her., v. 1.* The dropping out of one *Ida* would make the commencement of the line unintelligible, and the copyist would readily take *quamvis* out of v. 33 to make a beginning: "Ida can tell of the loves of the fountain nymph and the shepherd."

Propertius is fond of patronymics. I am inclined to think that in III. (IV.) xi. 17, Omphale is a gloss, and that the true reading is the patronymic *Iardanis*. *Ov., Her., ix. 103—*

Se quoque nympha tuis oneravit Iardanis armis.

I am not fond of transpositions, but I think the following is pretty certain:

III. (IV.), xv. 9.

Cuncta tuus sepelivit amor nec femina post te

Ulla dedit collo dulcia vincla meo.

Testis erit Dirce tam vero crimine saeva,

Nycteos Antiopen accubuisse Lyco.

"It is not clear of what fact Dirce is appealed to as a witness." Insert here verses 43, 44, which are out of place where they stand, and it will be quite clear, that Dirce's

story is appealed to as a proof that a woman's anger is relentless and unceasing—

At tu non meritam parcas vexare Lycinnam.
Nescit vestra ruens ira referre pedem :
Testis erit Dirce, *est*.

Hæc :

Insert *iam* before :

P.

Pe. Viden hostes :

Arripe opem auxiliumque ad hanc rem ! propere hoc, non plæ
cide, decet.

Antevenito aliqua aliquos : aut tu circumduce exercitum.

Curre in obsidium perduellis ; nostris praesidium para !

Intercludito inimicis commeatum ; tibi muni viam.

Read in the third line :

Antevenito aliqua : *aliquo saltu* circumduce exercitum—

I think this is preferable to Madvig's

Antevenito aliqua illos : aut tu circumduce exercitum.

The *s* of *saltu* was appropriated by the preceding *al* and the remaining *altu* naturally became the *auttu* or of the codices, for so they write it. There are plenty of passages in Livy to support my reading, with its *s* "lead round your army by some defile."

Most., I., ii. 32.

Véntat imbér, lavit párietes, pérpluunt
 Tígna, putréfacit áër operám fabri :
 Néquior fáctus iam úsus est aédium :
 Atque ea haud ést fabri cúlpa. Sed mágna pars
 Móram hanc induxérunt: si quid númo sarcirí potest,
 Úsque mantant, néque id . . . faciunt, dónicum
 Ruónt parietes.

ADDENDUM.

I see that the transposition proposed by me in *Propertius* III. xv. is an old suggestion, and is actually the reading of Kuinoel's edition. The old editions of this author are too much neglected.

A. P.

trouble to stuff up a hole in its walls. Of course *sarcium* is nearly as likely as *farcium*: but the dictionary gives plenty of examples of the use of *farcio* in this sense, as *Plin. H. N.* xxxvi. 22: "parietes medios farcire fractis caementis."

OVID. *Her.*, III. 39, 40.

Si tibi ab Atrida pretio redimenda fuissem
 Quae dare debueras accipere illa negas?

The hypothesis here is absurd, and the construction is too awkward for Ovid.—Read *Sic* for *Si*, with a full stop at the end of the first line. "I ought to have been thought by you deserving of being ransomed from Agamemnon, with a price like that now offered you. Do you refuse to accept what you ought to be offering?" *Cf. Prop.* III. [IV.] xv. 22, *Talis mors pretio vel sit emenda mihi.*

ARTHUR PALMER.

NOTES ON THE HISTORY OF TACITUS.

I. 26.

Ut *postero Iduum dierum* redeuntem a cena, &c.

SUCH is the reading of the Med. MS., and, if genuine, might, perhaps, be paralleled by Cæsar, *B. C.*, I. 23, “*postridieejus diei*.” But if we suppose “*postero die*”—referring to the events related in the preceding chapter—to have been the true reading, with the last few letters slightly obliterated, over which some one wrote *idie*, intending to give the reading *postridie*, this would account for the introduction of “*Iduum*” after “*postero*,” “*die*” being then altered to suit this reading. Bold as are some of Tacitus’ expressions, the MS. reading seems impossible Latin; *Iduum* is quite unnecessary, and the corruption may be accounted for as above.

I. 29.

Quo domus nostrae aut rei publicae *fatū* in vestra manu positum est. Med.

The editors have corrected *fatū* into *fato*. *Fatū* of the MSS. is evidently for *fatū* = *fatum*, so it seems a better mode of correction to write *quod*, the *d* of which would easily fall out before *domus*. The construction too is improved: “What fate is to befall our house and the state, rests with you.” The scribe would not be likely to give *fatū* for the at first sight more obvious *fato*, especially after writing *quo*, had the latter been the original reading.

I. 71.

Nec Otho quasi ignosceret, sed ne hostes metueret conciliationis
adhibens statim inter intimos amicos habuit.

Such is the reading of *a* and *b*, for here we are deserted by the Med. MS. owing to the loss of a leaf. Of this passage Orelli says "in medio relinquo," so I shall not examine the various emendations and explanations that have been proposed by various scholars, except to say that the only one which offers even a tolerable sense—that termed by Halm "palmaris emendatio," and admitted into his text, viz.: "sed deos testes mutuae reconciliationis,"—seems to me a mere attempt to cut the Gordian knot, an emendation made on the principle of regarding the letters in the MSS. as a kind of puzzle, to be put together into a form that will yield a sense, without the slightest effort to account for the corruption, displaying great ingenuity but utterly devoid of all probability. Heræus, its author, veritably introduces his "deos" ex machina, and the result is as clumsy as usual, for I think we shall find there is no *dignus vindice nodus* to justify such violence. Had the scribe found such a reading, what could have induced him to introduce such a totally different idea as the MSS. evidently point to? Now if we read *hostis* and *conciliationes*, neither a violent change, and put after *conciliationes* the comma which is universally put after *adhibens*, the words yield the following fair sense: "Otho did not treat him as if pardoning, but, to prevent his enemies fearing reconciliation with him, at once *admitted him and retained him among his intimate friends.*" Other slight changes would give perhaps equally good sense, *e. g.* *metuerent*; or to translate the text I have proposed: "to show that he did not fear perfect reconciliation with his enemy,"—taking *hostis* as a genitive depending on *conciliationes*,—but what I would chiefly insist on is that *adhibens* must be joined with the succeeding, not the foregoing clause. I think a much vexed passage of Shakspeare admits of a similar remedy.—*Tempest*, act III., sc. i.

"But these sweet thoughts do even refresh my labours,
Most busy lest, when I do it."

Putting the comma after "most" instead of after "labours," we get a satisfactory sense, which may be paraphrased "When engaged in the work, these sweet thoughts most refresh my labours, busy (thoughts) [*trouble*] me least." This "trouble" is to be supplied from "refresh," and this I believe to be quite in the manner of Shakspeare: and for the construction we may compare "forbidding to many and [commanding] to abstain from meats." But should this seem too violent to any, the last words may be taken thus "(being) least busy when I do it," *i. e.* "having least thoughts of the business when engaged in it." In either case the change of the position of the comma gives sense to the passage.

I. 72.

Cruditatem mox, deinde avaritiam *virilia* scelera exercuit.

The editors seeing that Tacitus could never have called avarice a *virile scelus*, add *et* before *virilia*, though it is wanting in both *a* and *b*. Read *vernilia* or *servilia*, and the passage gives excellent sense, an exact parallel to which is found in Hist. v. 9, "Antonius Felix per omnem servitiam ac libidinem jus regium *servili* ingenio exercuit."

II. 10.

Ut propria vi Crispus incubuerat delatorem fratris sui *pervertere*.

A very strange construction, though perhaps it might be defended by Virgil, G. iv. 248—"Incumbent generis lapsi *sarcire* ruinas," where however the exigencies of metre afford excuse. But *perverteret* is an easy emendation, for the *t* would naturally fall out before *traxerat* following. Then for the omission of *ut*—a Tacitean usage—cf. Hist. iii. 64, *incitabant* . . . *capesseret*, and iv. 20, *pepulerant* . . . *experiretur*.

II. 28.

Sin *victoriæ* sanitas, sustentaculum, columen in Italia *verteretur* non abrumpendos, &c.

"But if the reality, the support, the mainstay of success centre in Italy, you must not tear, &c.," *C. & B.* Now this is surely an impossible use of *verteretur*, even for a "mainstay centreing," whatever that may mean. Should we read *versaretur*? But even that is harsh. If we read *victoria*, and *Italiam*, the stroke over the *a* for *am* being often omitted by the scribes, and take *verteretur* as co-ordinate with the foregoing *sequerentur*, the sense is much simplified and improved. He had just said, "If a province be of more importance than the capital or the safety of the Empire, let us all follow them thither," and now goes on "but *if our safety depend on victory*, let our support and mainstay be turned (with us) into Italy—not diverted to the province;" and then a new sentence "you must not rend as it were from our body its stoutest limbs." For the omission of *esset*, in the clause "*si victoria (esset) sanitas*" compare *An.* i. 65: "cum . . . apud Romanos invalidi ignes (*essent*)."¹ But perhaps, after all, we might by a slightly more violent alteration achieve a better reading, and one which is free from the awkward ellipse of *esset*, viz. "Sin *victoria sanitas sustentaretur, incolumes in Italiam verterentur, &c.*"—"But if our very life-blood must be nourished by victory, let us with undiminished forces turn into Italy, &c." Cic. *Ad Att.* iv. 10, has "sustentor literis." Virg. *Aen.* x. 609 "(Venus) Trojanas sustentat opes;" so surely Tac. might use "*sanitas sustentaretur.*" For *incolumes* = "undiminished," cf. Cæsar, *B. C.*, ii. 32: "*exercitum incolumem traducere.*"² This reading gives perfect sense, for what the troops wanted was to make sure of victory by keeping their forces undiminished; but to account for the corruption is not easy. Perhaps the *in* of *incolumes* became attached as *m* to the preceding word—an error of frequent occurrence in MSS.—and the scribe then altered the strange *sustentaretum* to the only similar word he could think of, itself a $\alpha\pi. \lambda\epsilon\gamma.$

II. 81.

Et e Judaico exercitu lecta *decora*.

Read *corpora*, as the phrase *lecta corpora* is of frequent use in Tacitus. The plur. *decora* could scarcely be used for *robur*, though we have *decus* in a somewhat similar sense. *Catullus*, 64, 78, “*decus innuptarum*,” “the choicest of the maidens,” *ἀνθος παρθένων*.

II. 82.

Dux Mucianus et Vespasiani *nomen* ac nihil arduum fatis.

Read *numen*, comparing *Hist.* ii. 33, “*fortunam et deos et numen Othonis adesse consiliis*.” This correction is suggested by the following words, and seems to yield a much more vigorous sense.

II. 75.

Si unus alterque *præsenti facinora* paratum ex diverso *praemium* petat.

So the MSS. The corrections into *facinori* or *facinore* are both difficult, so that Ern. is driven to render “*præsens*” by *audax*. If we read *præbenti* or *præstanti* we get an easy sense, “the reward their opponents had ready for the man that offered them deeds of daring.” Cf. *Ann.* ii. 10, “*indeditionem venienti paratam clementiam*.”

IV. 42.

Et quem adhuc quaestorium offendere non audemus, praetorium et consularem *visuri* sumus.

Orelli renders *visuri* by *toleraturi*, but adduces no passage in support of such a rendering; and even if *visuri* could bear this meaning, the sense of the passage would still be faulty. That a man as *quæstor* would not brook insult, or that others should not dare to offer it to him, is surely but a poor argument for his being “intolerable,” as *prætor* and *consul*. Madvig reads *ausuri* which gives a

very easy but unsatisfactory sense; for, besides the un-Tacitean repetition,—non audemus . . . ausuri;—it seems very unreasonable to suppose that Montanus should imply the villany of Regulus from his inspiring men with fear of insulting him in a magistracy whether high or low. He had just said that his villany when unsuccessful induced others to emulate it, and asks—What would be the result if it were manifested with success in a high and important post? Now, the senators were accustomed to pay complimentary visits to the magistrates, as we learn from *Hist.* iii. 66, where Vespasian is termed *Vitelli cliens*, which words can admit of no other interpretation. *Offendere* in Ter. *Eun.*, iv., iv., 5, &c., means “finding one at home.” If then we take *visuri* as fut. part. of *viso*, might not the meaning of the entire passage be—“Shall we have to visit as consul or prætor that man whom we *dared not find at home* (or ‘*encounter*’) when a mere questor?” They felt relieved to find that he was out, so violent and intolerable was his character.

IV. 65.

Agrippinenses sumpto consultandi spatio, quando neque subire condiciones metus futuri neque palam aspernari *condicio* præsens sinebat, &c.

These words can scarcely be right; for even if *condicio* could bear the required meaning, which is very doubtful, it would never have been so used after occurring in its usual sense in the foregoing line. Suppose it to be a gloss—“*condiciones*”—supplying an object to *aspernari*, or, as seems to me more likely, the result of ἀπόβλεψις, we may then omit it and so get perfect sense, while the construction “metus futuri neque (metus) præsens” has a peculiarly Tacitean flavour.

PHILIP SANDFORD.

NOTES ON DR. W. SMITH'S LATIN
DICTIONARY.

ANGINA.—The penult of this word is marked long in the Dictionary. Its quantity is determined by the following passages¹ :—

Insperato abiit, quem una angīna sustulit hora.

LUCILIUS, xxx., 90.

Angīna vero sibi mixtum sale poscit acetum.

SERENUS SAMMONICUS, 282.

Areo.—Neither under this verb nor under the inceptive form *aresco* is a perfect tense given, although the past-perfect is found in Lucan's *Pharsalia*, iv., 55 :

Atque omnis propior mergenti sidera caelo
Aruerat tellus hiberno dura sereno.

Cacula.—The first syllable is marked short. It is however long in

Veniētem, cāculam intervortit sýmbolo.

PLAUT., *Pseud.*, *Argum.*, 4.

And it may also be long in

Vídeo caculam mīlitarem mé futurum haud lóngius.

PLAUT., *Trin.*, iii., 2, 95.

In the latter passage, however, Brix regards it as short.

¹ See *Ritschl on Trinummus*, Praef. quoted therein.
lxvii., ed. 1871, and L. Müller's letter

Celox.—No notice is taken of the fact that Livy makes **his** word masculine :

Celoces viginti deducti, xxi., 17.

Apparuit inde piraticos celoces et lembos esse, xxxvii., 27.

Coquino.—The penult is short, not long as marked :

An tú coquinatum te íre quoquam póstulas.

PLAUT., *Pseud.* iii., 2, 64.

Néque ego unquam nisi hódie ad baccas véni in baccanál
coquinatum.

PLAUT., *Aul.* iii., 1, 3.

See Wagner's note on the second passage.

Coturnix.—The quantity of the first syllable is not indicated. It is common :

Praeterea, nobis veratrum est acre venenum,

At capreis adipēs et cōturnicibus auget.

LUCRETIVS, iv., 642, 643.

Ecce cōturnices inter sua proelia vivunt.

OVID, *Amor.*, ii. 6, 27.

Libet expectare, quis aegram

Et claudentem oculos gallinam impendat amico

Tam sterili. Verum haec nimia est impensa : cōturnix

Nulla unquam pro patre cadet.

JUV., xii., 95-98.

Cuculus.—To the metrical values assigned to this word, z., cūcūlus and cūcūlus add cūcūlus : see Brix on

Ibi ille cūcūlus : "o océlle mi, fíat."

PLAUT., *Trin.* ii., 1, 23.

Cunila.—The penult is marked long, probably from the analogy of the Greek word *κονίλη*. It is short, as shown by the following passage :—

Est: nón illa, cubi tus gígnitur
Séd ubi apsinthiúm fit atque cúnlla gallinácea.

PLAUT., *Trin.* iv., 2, 89.

Denixe.—This word is not given. It is adopted by Ritschl in Plaut., *Trin.* iii., 2, 26, on the authority of Placidus. See Ritschl's article "Zu Placidus und lateinischer Glossographie," in the *Rheinisches Museum für Philologie*, vol. xxv., p. 460.

Gnaruris.—The metrical value of this word is not given. It is decided by the following passages:—

Ad árgumentum núnc vicissatím volo
Remígrare, aequé ut mécum sitis gnárüres.

PLAUT., *Poen.*, *Prol.*, 46, 47.

Non cultor instans, non arator gnárüris.

AUSON., *Epist.*, xxii., 19.

Imbecillus.—No notice is taken of the fact that Prudentius shortens the second syllable of this word:

Deque imbēcillis subjugavit fortia
Simplex ut esset credere.

Pref. ad Apolh., 31, 32.

Pastis visceribus ciboque sumpto,
Quem lex corporis imbēcilla poscit,
Laudem lingua Deo patri rependat.

Cath., iv., 1, &c.

Laudate vestrum principem
Omnes beati ac perdití,
Vivi, imbēcilli ac mortui;
Jam nemo posthac mortuus.

Cath., xii., 205–208.

Inconciliare.—This word is explained in Plautus, *Trin.*, i., 2, 99, as "to win over to one's side, to conciliate." In the *Mostellaria*, iii., 1, 85, and *Bacchides*, iii., 6, 22, it is explained "to make an enemy of, to turn against," the initial *in* being regarded as negative.

The first interpretation can hardly be made to suit the meaning of the passage for which it is proposed ; the second interpretation violates a rule to which there are at any rate very few exceptions, namely, that, although *in* has frequently a negative force when compounded with adjectives or participles, it never has this force when compounded with verbs.

The true meaning of the word may be gathered from the notes of either Ramsay, Lorenz, or Brix, but is most clearly given by the last-named commentator.

The verb *conciliare* primarily means "to bring together," and hence comes *conciliatrix*, "a go-between, an intriguing woman ;" as Festus says, "conciliatrix dicitur quae viris conciliat uxores et uxoribus viros." Hence *inconciliare* is *conciliando inducere*, "to lead on by intrigues, to involve in intrigues" :

Inconciliastin' eum qui mandatust tibi ?

PLAUT., *Trin.*, i., 2, 99.

[“ Have you not involved in intrigues the person who was entrusted to your care ?”]

Ne inconciliare quid nos porro postules.

Most., iii., 1, 85.

[“ Do not attempt to involve us in any further difficulties.”]

Ille, quod in se fuit, adcuratum habuit, quod posset mali
Facere, et in me inconciliare copias omnes meas.

Bacch., iii., 6, 22 (Weise's text).

[“ He took care, as far as in him lay, to do whatever evil he could, and by his intrigues to turn my forces against myself.”]

Nudius.—Although formed from *nunc* and *dinus* (= dies),

the first syllable is short, not long (as marked in the Dictionary) in Plautus. See Brix on

Ad forum ibo : núdius sextus quof talentum mútuom
Dédi reposcam.

PLAUT., *Trin.*, iii., 2, 101.

Ōhe.—The penult of this word is marked short. It is common :

Tum pueri nautis, pueris convicia nautae
Ingerere. Huc appelle. Trecentos inseris ; ōhe
Jam satis est.

HOR. *Sat.*, i., 5, 12.

Importunus amat laudari ? donec ' ōhe jam ! '
Ad coelum manibus sublatis, dixerit, ' urge'.

Sat. ii., 5, 96.

Ōhe jam satis est, ōhe libelle.

MARTIAL, iv., 91.

Palus.—No notice is taken of the fact that the last syllable of this word is shortened by Horace in *A. P.*, 65 :

Regis opus, sterilisque diu palūs, aptaque remis.

Proficiscor.—Attention should be called to the fact that Plautus sometimes lengthens the first syllable of this verb :

Quoniam hinc est profectúrus peregre Chármides.

Trin., i., 2, 112.

Quasi.—No derivation is assigned. *Quasi* probably quam si :

Neque erile hic negotium plus curat quasi non servitút
serviat.

Mil. Glor., ii., 6, 2.

Me nemo magis respiciet, quasi abhinc ducentos annos
fuerim mortuos.

Trin., ii., 3, 20.

Nam qui in amorem praecipitavit, pejus perit quasi saxum
saliat.

Trin., ii., 1, 30.

Recommentari.—This verb should perhaps be added to the Dictionary. It is adopted by Ritschl after Salmasius in *Trin.* iv., 2, 67 :

Jam recommentatu's nomen ?

Siler.—Siler is given instead of sīler :

Curva tenent : ut molle sīler, lentaeque genistae.

VERGIL, *Geor.*, ii., 12.

It occurs as the name of a river in Lucan, *Phars.* ii., 425 :

radensque Salerni

Culta Siler, &c.

Simitu.—The quantity of the penult is not marked. It is long :

Gratia habetur utrisque illisque sibique simītu.

LUCILIUS, xxx., 47.

Siparium.—Sipārium instead of sīpārīum :

Consumptis opibus vocem, Damasippe, locasti

Sipārīo, clamosum ageres ut Phasma Catulli.

JUVENAL, viii., 185, 186.

But this is, probably, only an error of the press.

Thermopoto.—This word is said to be formed from the Greek θερμός, and Latin *pōto*. Not only does this derivation assume that the word is hybrid, but it also fails to account for the quantity of the penult, which is short.

It is no doubt from a Greek verb θερμοποτεῖν, which does not indeed occur in any classical author, but is supported by the analogy of ψυχροποτεῖν, and by the substantive θερμοπότης, both of which are found.

Vatinii; *vitelliani*.—These words are not given.

The former, meaning "cups or tumblers," is found in Martial, x., 3 :

Vatiniorum proxeneta fractorum.

The latter, meaning "writing tablets," occurs in *Martia* ii., 6 :

Haec sunt quae relegente me solebas
Rapta scribere, sed vitellianis ;

and *Martial*, xiv., 8 :

Nondum legerit hos licet puella,
Novit quid capiant vitelliani.

Both words are doubtless derived from proper names though a different derivation has been suggested for *vitelliani*.

Verbena.—The plural only of this word is given. The singular, however, is found *Verg. Æn. xii.*, 120 :

Alii fontemque ignemque ferebant
Velati limo et verbenae tempora vincti ;

also in *Prudentius, Apotheosis*, 473 :

Caesarum sanguis pecudum, verbenae, coronae.

CHARLES HAINES KEENE.

SUPPLEMENTAL NOTE ON THE DESTRUCTION OF MYCENÆ BY THE ARGIVES.

THE publication of Dr. Schliemann's researches at Tiryns and Mycenæ, since my Paper was printed, has made a few additional words on the subject necessary.

Having examined his book carefully, I found my *a priori* theory, which was drawn from the confused statements of bad, and the silence of good, authorities, strangely corroborated. Amid the thousands of objects he found, *there is not one which can be ascribed with any probability to the period 660-460, B. C.* My friend Professor Sayce, who has since visited the spot, made further inquiry for me from M. Stamatakes, and corroborates me in this assertion, though the Greek archæologist cautiously declined to make a positive statement till the completion of the excavations. But it seems quite certain that, had a Hellenic city really existed there during the period in question, there must have been constant and unmistakeable traces found.

This negative evidence is so strong, that my concession about the survival of Tiryns and Mycenæ as villages must be given up, and the early destruction of both cities must be considered complete. Dr. Schliemann, in a private communication to me, thinks the evidence of Herodotus cannot be questioned on such a point. I perfectly agree with him, but what is the evidence? He never talks of Mycenæ and Tiryns siding with the Greeks, but of a few Mycenæans and Tirynthians joining the army; and to this phrase I should have adhered more carefully in my Paper. These people were exiles, like the Messenians, who were called

Messenians long after they had been expelled from their country. Mycenæ is never, I think, mentioned by Herodotus, and his mention of Tiryns (vi. 83) conveys to my mind the impression that the town was then deserted: "The slaves (of Argos, who had revolted), being thrust out, seized Tiryns forcibly. For some time after, they were at peace with one another," till an Arcadian prophet came, and incited the slaves to attack their masters. After a long struggle, the Argives prevailed. All this happened during the generation before the Persian Wars. I ask is it possible that the slaves could have settled peacefully at Tiryns, if a free population had still been there? Moreover, Herodotus does not say one word about a struggle of the slaves with the Tirynthians, but only with the Argives. Now, according to my theory, the slaves seized the empty fort, which even now could be made a stronghold against an attack without fire-arms. As these slaves were a conquered race, known under the title *Γυμνήσιοι*, they may really have been Mycenæans and Tirynthians, or professed to be such; and if their occupation of Tiryns lasted twenty years, the remainder of them, when finally expelled by the Argives, may be the men who joined the Greeks in the crisis of the Persian War, and were gladly received under their real or assumed titles without nice inquiry into their descent.

I must add, in conclusion, that while the negative side of my argument against the received date appears to me very strong—the conjecture as to the real date is not put forward with any confidence. But I think the definiteness of the tradition concerning the conquest seems to imply that it was within historic times, and not by any means so old as the *συννοικισμός* of Attica, or the Dorian invasion. Hence the epoch of Pheidon seems the most probable.

J. P. MAHAFFY.

ON A RECIPROCAL RELATION BETWEEN THE
EQUATIONS OF A SYSTEM OF FOUR CIRCLES
AND THE EQUATIONS OF A SYSTEM OF FOUR
OTHER CIRCLES TANGENTIAL TO THEM.

THE subject of this Paper is the proof and some of the applications of the following general theorem :—*If a circle Σ touch any number of circles $S_1, S_2, \dots S_n$, and if we denote by $P(i)$ the product of the common tangents drawn from any circle S_i of the system to the remaining circles, then the equation of the touching circle Σ will be a factor in the equation*

$$\frac{S_1^{\frac{n-2}{2}}}{P(1)} - \frac{S_2^{\frac{n-2}{2}}}{P(2)} + \frac{S_3^{\frac{n-2}{2}}}{P(3)} \dots \pm \frac{S_n^{\frac{n-2}{2}}}{P(n)} = 0, \quad (1)$$

the common tangent to any two circles being the direct or the transverse according as they lie on the same or on opposite sides of Σ .

2. For the proof of the general equation (1), we require the two following propositions :—

1° If $\alpha, \beta, \gamma, \dots \nu$, be the roots of an algebraic equation of the n^{th} degree, $f(x) = 0$, then

$$\frac{\alpha^{n-2}}{f'(\alpha)} + \frac{\beta^{n-2}}{f'(\beta)} + \&c., \quad \frac{\nu^{n-2}}{f'(\nu)} = 0. \quad (2)$$

This theorem, which is well known, may be proved as follows :—If the simple fractions into which

$$\frac{x^{n-2}}{f(x)}$$

can be decomposed be represented by

$$\frac{A}{x-a}, \frac{B}{x-\beta}, \frac{C}{x-\gamma}, \dots \frac{N}{x-\nu},$$

then by comparison of coefficients, we get

$$A + B + C \dots N = 0;$$

and by the theory of the decomposition of rational fractions,

$$A = \frac{a^{n-2}}{f'(a)}, \quad B = \frac{\beta^{n-2}}{f'(\beta)}, \quad \&c.$$

Hence the proposition is proved.

2° If two circles be inverted with respect to any arbitrary circle, the square of their common tangent divided by the rectangle under their diameters remains unaltered by inversion.

This theorem was first enunciated in this form in a Paper by the Author in the *Quarterly Journal*, vol. vii., page 378. It is, however, only a special case of a theorem of transformation by imaginary variables. See Koenigsberger, *Theorie der Elliptischen Functionen*.

3. As we shall consider only the special cases $n = 3$ and $n = 4$ of our general equation (1), it will be sufficient to prove it for one of these particular cases, say $n = 4$, and the proof for the general case, which is similar, will be evident.

Let $f(x) = 0$ be a biquadratic equation whose roots arranged in order of magnitude are a, β, γ, δ ; then from our equation (2) we have

$$\begin{aligned} & \frac{a^2}{(a-\beta)(a-\gamma)(a-\delta)} + \frac{\beta^2}{(\beta-a)(\beta-\gamma)(\beta-\delta)} \\ & + \frac{\gamma^2}{(\gamma-a)(\gamma-\beta)(\gamma-\delta)} + \frac{\delta^2}{(\delta-a)(\delta-\beta)(\delta-\gamma)} = 0. \quad (3) \end{aligned}$$

Now let O be the origin, and let $OA = \alpha$, $OB = \beta$, &c., and we have from equation (3)

$$\frac{OA^2}{AB \cdot AC \cdot AD} + \frac{OB^2}{BA \cdot BC \cdot BD} + \frac{OC^2}{CA \cdot CB \cdot CD} + \frac{OD^2}{DA \cdot DB \cdot DC} = 0. \quad (4)$$

This equation may evidently be written

$$\frac{OA^2}{AB \cdot AC \cdot AD} - \frac{OB^2}{AB \cdot BC \cdot BD} + \frac{OC^2}{AC \cdot BC \cdot CD} - \frac{OD^2}{AD \cdot BD \cdot CD} = 0, \quad (5)$$

where each segment AB , AC , &c., is positive.

4. Let circles whose radii are r_0, r_1, r_2, r_3, r_4 , touch the line OD at the points O, A, B, C, D , respectively: then we get from equation (5)—

$$\begin{aligned} & \frac{OA^2}{r_0 r_1} \div \frac{AB \cdot AC \cdot AD}{\sqrt{r_1 r_2 \cdot r_1 r_3 \cdot r_1 r_4}} - \frac{OB^2}{r_0 r_1} \div \frac{AB \cdot BC \cdot BD}{\sqrt{r_1 r_2 \cdot r_2 r_3 \cdot r_2 r_4}} \\ & + \frac{OC^2}{r_0 r_3} \div \frac{AC \cdot BC \cdot CD}{\sqrt{r_1 r_2 \cdot r_2 r_3 \cdot r_3 r_4}} - \frac{OD^2}{r_0 r_4} \div \frac{AD \cdot BD \cdot CD}{\sqrt{r_1 r_4 \cdot r_2 r_4 \cdot r_3 r_4}} = 0. \quad (6) \end{aligned}$$

Now, if the whole figure be inverted from any arbitrary point, and the circle into which the line inverts be denoted by Σ , and the circles touching it at the points O, A, B, C, D be denoted by S_0, S_1, S_2, S_3, S_4 , the common tangents of the inverse circles by $(01), (02), (12)$, &c., and their radii by $\rho_0, \rho_1, \rho_2, \rho_3, \rho_4$, we have from equation (6), by means of our second lemma, and omitting factors that will divide out,

$$\begin{aligned} & \frac{(01)^2}{(12)(13)(14)} - \frac{(02)^2}{(12)(23)(24)} + \frac{(03)^2}{(13)(23)(34)} \\ & - \frac{(04)^2}{(14)(24)(34)} = 0. \quad (7) \end{aligned}$$

If the circle whose radius is ρ_0 reduce to a point, that point will be on the circle Σ , and $(o_1)^2$ will be the square of the tangent drawn from it to the circle S_1 ; that is, it will be the result of substituting the co-ordinates of the point in the equation of S_1 . Hence the equation of Σ will be given by the equation—

$$\frac{S_1}{(12)(13)(14)} - \frac{S_2}{(12)(23)(24)} + \frac{S_3}{(13)(23)(34)} - \frac{S_4}{(14)(24)(34)} = 0; \quad (8)$$

or

$$\frac{S_1}{P(1)} - \frac{S_2}{P(2)} + \frac{S_3}{P(3)} - \frac{S_4}{P(4)} = 0. \quad (9)$$

And the general equation (1) may be proved in a manner exactly similar.

Application.

5. Let $n = 3$, and we have from the general equation

$$\frac{S_1^{\frac{1}{2}}}{(12)(13)} - \frac{S_2^{\frac{1}{2}}}{(12)(23)} + \frac{S_3^{\frac{1}{2}}}{(13)(23)} = 0. \quad (10)$$

Hence if we put $(23) = l$, $(31) = m$, $(12) = n$, we get, after clearing of fractions and radicals,

$$l^2 S_1^2 + m^2 S_2^2 + n^2 S_3^2 - 2lm S_1 S_2 - 2mn S_2 S_3 - 2nl S_3 S_1 = 0. \quad (11)$$

This is the equation of one of the four pairs of circles touching the circles S_1 , S_2 , S_3 , and the equations of the other pairs of touching circles are got from it by using transverse instead of direct common tangents. See *Proceedings of the Royal Irish Academy*, vol. ix., part iv.

6. Let $n = 4$, and our general equation reduces to equation (8). Now let Σ_2 , Σ_3 , Σ_4 be any three circles, and let S_1 , S_2 , S_3 , S_4 be circles touching them, correspond-

to the inscribed and escribed circles of a plane triangle. Again, let Σ_1 correspond to the "Nine Points Circle" of the triangle: that is, let Σ_1 be touched externally by S_2, S_3, S_4 , and internally by S_1 . Then, denoting transverse common tangents by the notation $(12)', (23)'$: that is, by the same notation as the direct common tangents only with accents, we have from equation (8) the equations of $\Sigma_1, \Sigma_2, \Sigma_3, \Sigma_4$, expressed linearly in terms of the equations of S_1, S_2, S_3, S_4 , by the following system of equations:—

$$\Sigma_1 \equiv \frac{S_1}{(12)'(13)'(14)'} - \frac{S_2}{(12)'(23)'(24)} + \frac{S_3}{(13)'(23)'(34)} - \frac{S_4}{(14)'(24)'(34)} = 0. \quad (12)$$

$$\Sigma_2 \equiv \frac{S_2}{(21)'(23)'(24)'} - \frac{S_3}{(23)'(34)'(31)} + \frac{S_4}{(24)'(34)'(41)} - \frac{S_1}{(21)'(31)'(41)'} = 0. \quad (13)$$

$$\Sigma_3 \equiv \frac{S_3}{(31)'(32)'(34)'} - \frac{S_4}{(34)'(41)'(42)} + \frac{S_1}{(13)'(12)'(14)} - \frac{S_2}{(23)'(21)'(24)} = 0. \quad (14)$$

$$\Sigma_4 \equiv \frac{S_4}{(41)'(42)'(43)'} - \frac{S_1}{(14)'(12)'(13)} + \frac{S_2}{(24)'(21)'(23)} - \frac{S_3}{(34)'(31)'(32)} = 0. \quad (15)$$

COR.—If we suppose the circles $\Sigma_2, \Sigma_3, \Sigma_4$, to become right lines, forming a triangle whose three sides are a, b, c , the equation of the "nine points circle" of this triangle is

$$\frac{S_1}{(a-b)(b-c)(c-a)} + \frac{S_2}{(a+b)(b-c)(c+a)} + \frac{S_3}{(a+b)(b+c)(b-a)} + \frac{S_4}{(a-b)(b+c)(c+a)} = 0. \quad (16)$$

7. The system of equations (12)–(15) lead to a very remarkable relation which connects the two systems of circles S_1, S_2, S_3, S_4 and $\Sigma_1, \Sigma_2, \Sigma_3, \Sigma_4$, and this relation is reciprocal. In order to explain it, let the general function of the second degree in S_1, S_2, S_3, S_4 , viz.,

$$\begin{aligned} & \frac{S_1^2}{(12)(12')(13)(13')(14)(14)'} + \frac{S_2^2}{(21)(21')(23)(23')(24)(24)'} \\ & + \frac{S_3^2}{(31)(31')(32)(32')(34)(34)'} + \frac{S_4^2}{(41)(41')(42)(42')(43)(43)'} \\ & - \frac{2S_1S_2}{(12)(12')(13)(14)(23)(24)} - \frac{2S_2S_3}{(23)(23')(21)(24)(31)(34)} \\ & - \frac{2S_3S_4}{(34)(34')(31)(32)(41)(42)} - \frac{2S_4S_1}{(24)(24')(42)(43)(12)(13)} \\ & + \frac{2S_1S_3}{(13)(13')(12)(14)(32)(34)} + \frac{2S_2S_4}{(24)(24')(21)(23)(41)(43)} \quad (17) \end{aligned}$$

be denoted for shortness by

$$\phi(S_1, S_2, S_3, S_4);$$

and if we differentiate with respect to each of the quantities S_1, S_2, S_3, S_4 , we find, after rejecting factors which divide out,

$$\frac{d\phi}{dS_1} \equiv \Sigma_1, \quad \frac{d\phi}{dS_2} \equiv \Sigma_2, \quad \frac{d\phi}{dS_3} \equiv \Sigma_3, \quad \frac{d\phi}{dS_4} \equiv \Sigma_4, \quad (18)$$

which is the relation to be found.

8. Since $\Sigma_1, \Sigma_2, \Sigma_3, \Sigma_4$ are circles touching S_1, S_2, S_3, S_4 in the same manner as the latter system touch the former, it is evident that there is a similar function of these circles which we may denote by

$$F(\Sigma_1, \Sigma_2, \Sigma_3, \Sigma_4),$$

such that

$$\frac{dF}{d\Sigma_1} \equiv S_1, \quad \frac{dF}{d\Sigma_2} \equiv S_2, \quad \frac{dF}{d\Sigma_3} \equiv S_3, \quad \frac{dF}{d\Sigma_4} \equiv S_4. \quad (19)$$

COR.—The functions ϕ and F denote bicircular quartics, and are reciprocals. See my *Treatise on Bicircular Quartics*.

Observation.—I have extended the results obtained in his Paper to circles on the surface of a sphere, and to conics having double contact with a given conic; but the space at my disposal in “*Hermathena*” does not admit of carrying out these extensions. I may, however, publish them elsewhere.

JOHN CASEY.

NOTE ON THE HISTORY OF THE THEORY OF FRICTION.

TO THE EDITOR OF "HERMATHENA."

SIR,

I ought perhaps to apologize for occupying your pages with the discussion of a question which is, comparatively, so unimportant to the scientific world as the claims of an individual author to priority. Still, as such questions are not altogether without importance even to science itself, and as I can compress into a small space everything which I have to say, I venture to trouble you with the following statement:—

In the Preface to a recently published treatise upon Statics,¹ the following passage occurs. After acknowledging his obligations to me, the author adds:

"All that is essential in the rational theory of friction had, however, been given long before with remarkable clearness by the Rev. Canon Moseley (see his *Illustrations of Practical² Mechanics*)."

¹ *A Treatise on Statics*, containing some of the fundamental propositions in Electro-Statics. By George M. Minchin, Senior Moderator in Mathematics and Natural Philosophy, and Professor of Applied Mathematics in the Royal Indian Engineering College, Cooper's Hill.

² I cannot find that Canon Moseley has published any work bearing the title given by Mr. Minchin. Canon Moseley published *Illustrations of Me-*

chanics in the year 1839. This book ran through four editions, of which I have seen the first, second, and fourth. They all bear the same title. It is, however, true that the title "*Illustrations of Practical Mechanics*" does appear in three London publishers' lists, namely:

The London Catalogue of Books, 1831-33.

The English Catalogue of Books, 1835-64.

The British Catalogue of Books, 1837-52.

But the real title, taken from the book itself, is as I have given it.

There is of course a sense in which it may be said that "all that is essential in the rational theory of friction" was given before either Mr. Moseley or I wrote a line upon the subject.

The theory of friction is based upon experiment, and neither Mr. Moseley nor I claim to have made any experiments. In this sense of the words, all that is essential in the theory of friction is contained in the experiments of Coulomb and Morin. Neither Mr. Moseley nor I can claim to have added anything to it. But I suppose it to be meant that every important *general* proposition in the theory of friction given by me had been previously given by Mr. Moseley. It is upon the statement considered in this sense that I wish to offer some observations. The principal propositions in the theory of friction, as I have stated it, are as follow:—

1. Friction is the resistance which we experience when we attempt to move one body along the surface of another, against which it is pressed.
2. If the first body be reduced to a particle, the force of friction is, in direction, immediately opposed to the tangential component of the force which acts upon the particle, if it be at rest, and to the direction of its motion along the rough surface, if the particle be in motion.
3. The intensity of the force of friction may have any value from zero up to a certain limit, which is obtained by multiplying the normal pressure of the particle against the surface by a coefficient depending upon the nature of the particle and that of the surface. This coefficient is called the *coefficient of friction*.
4. Friction is of two kinds, denominated respectively *statical* and *dynamical* friction, the former being the friction which acts upon a particle at rest, and the latter being the friction which acts upon a particle in motion. These two kinds of friction are distinguished from each other by the

magnitudes of their coefficients, the coefficient of statical friction being greater than the coefficient of dynamical friction.

5. Statical and dynamical friction are further distinguished as follows :—

In a system of particles, each of which rests upon a rough surface, we are at liberty to assume for the directions of the forces of *statical* friction any system of lines touching the supporting surfaces respectively at the points where the particles are placed. But for the directions of the forces of dynamical friction we are restricted to those systems of lines which are capable of representing real movements.

6. The *resistance* of a rough surface, being the resultant of the normal reaction and the force of friction, is a force unlimited in intensity, and subject to the single geometrical condition, that its line of direction cannot lie outside a cone of revolution, whose axis is the normal to the supporting surface, and whose vertical angle is given by the equation

$$\tan \frac{1}{2} \theta = \text{coefficient of friction.}$$

7. Equilibrium, in a system where friction acts, is of two kinds, namely, *necessary* equilibrium and *possible* equilibrium. If a system be placed without velocity in a position of necessary equilibrium, it *must* remain at rest. If it be placed without velocity in a position of *possible* equilibrium, it may either remain at rest or move, according as certain conditions are or are not fulfilled.

8. In the case of a system in equilibrium, the actual amount of friction developed at each point of contact cannot, in general, be determined by the principles of Statics. The cause of this indeterminateness, which cannot really exist in Nature, is to be found in the abstractions of Rational Mechanics, in which bodies are assumed to be perfectly hard and rigid, which are really compressible and

elastic. The ambiguity is removed by considering the phenomenon as it really is. When a body is placed in a (so called) position of equilibrium, it will, in general, commence to oscillate under physical conditions which are perfectly determinate. If the equations of these small oscillatory movements be formed and solved, the amount of friction developed at each point of contact can be determined at any given instant. We can also determine the time at which the body comes finally to rest, and therefore the actual force of friction at each point when this permanent condition has been attained.

9. Of the two kinds of movement of which a solid body, in contact with a rough surface, is capable, namely, slipping and rolling, the latter will always take place if it be possible, inasmuch as the force of friction will always, if possible, reduce to rest that point of the body at which it acts. The method of solving such questions is therefore to assume the motion to be one of rolling *without* slipping, and, having solved the question on this assumption, to determine the value of the force of friction at the point of contact. If this value do not exceed the proper limit, the assumption was correct, and the motion is one of pure rolling. If the value do exceed the proper limit, the motion is a combination of rolling and slipping, and the problem must be re-investigated on this supposition.

10. If the surface which supports a moving particle be itself in motion, the line of direction of the force of friction is the tangent to the *relative* path of the particle, that is to say, the path of the particle *on the surface*.

The principles contained in the first four propositions have been long known, although the direction of the force of statical friction has been tacitly assumed rather than distinctly stated. That the actual force of friction may have any value from zero up to a certain limit, and that it will assume such a value as will if possible retain the body

at rest, is implied in the statement that if a heavy body be placed on a rough plane, whose inclination to the horizon is gradually increased, the body will remain at rest until the inclination attains a certain magnitude.

The distinction between statical and dynamical friction, stated in the fifth proposition, was, as far as I am aware, first given by me. It may, however, be easily deduced from the second proposition.

The sixth proposition is due to Mr. Moseley. The principle of compounding the normal reaction and the force of friction into a single force called the resistance, and the geometrical condition by which this force is restricted, were originally given by him.

The seventh proposition was first given by me (*Theory of Friction*, chap. vi.).

Part of the eighth proposition is due to Mr. Moseley. He has noticed (*Cambridge Philosophical Transactions*, vol. v., p. 305) the indeterminateness existing in certain problems of equilibrium as treated by the methods of ordinary Statics, adding that, for the solution of such problems, recourse must be had to other principles. But I cannot find that he has anywhere stated either the cause of this indeterminateness or the principles by means of which the problem is to be actually solved. I have given both (*Theory of Friction*, chap. vii.).

The method, stated in the ninth proposition, (*Theory of Friction*, chap. v.), of determining the real motion of a body which is geometrically capable of the two movements, slipping and rolling, is employed by Mr. Moseley in a particular case (*Philosophical Transactions* for 1851, p. 564). But I cannot find that he has given any reason for the preference of a motion of pure rolling to one of slipping and rolling.

The question, noticed in the tenth proposition (*Theory of Friction*, chap. iv., sec. 4), of the movement of a particle

upon a rough surface which is itself moving, has not, so far as I am aware, been considered by Mr. Moseley.

I must now leave your readers to judge whether it be true that the rational theory of friction was exhausted by Moseley.

I am, Sir,

Your obedient Servant,

JOHN H. JELLETT.

TRINITY COLLEGE,

Nov., 1877.



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ADDENDA ET CORRIGENDA.

Page 306, line 7, *dele* the words "following Jahn," and *substitute* the words "by his translation."

Page 316, line 11, *add*, "'vultum osque' would be as near the MSS. as anything else."

Page 364, to note on Att. v. 4, 2 *add*: *Consule* in Att. v. 4, 2, might be explained thus:—if the consul or president asked merely for a division on the question which he brought before the senate, some senator might call out *consule*, in the sense of *rem refer per sententias exquisitas*, "take the opinions all round in regular order." However, there is no evidence that *consule* was used to express this formal mode of debate, as distinguished from a decision by division (*discessio*).

HERMATHENA.

ELLIS'S CATULLUS.

ALTHOUGH somewhat late in doing so, I heartily congratulate Mr. Ellis on the result of his assiduous labours, and the completion of a work which will long remain a memorial of his high and finished scholarship. Few, very few, books can pretend to vie with this in the amount of care bestowed upon it. Indeed, scarcely excepting Mr. Munro's *Lucretius*, it would be difficult to name a classical work published in England during the memory of the present generation which exhibits anything like the same minute and painstaking industry.

The first part of Mr. Ellis's great work, and the most important part, issued from the Clarendon Press just eleven years ago, in 1867. It contains the Latin prolegomena, devoted chiefly to an account of the Mss. and editions of the poet; the recension of the text and the close collation—in a great measure original—of some twenty Mss.; the insertion below the text, in their proper place, of the references to the text of our poet in classical and post-classical authorities—one of the most valuable portions of the work; a long dissertation on the supposed numerical concordances of the poems; and some exhaustive "Excursus" on passages notable for corruption or diffi-

culty. The second edition of this volume has now made its appearance. It does not differ very largely from the first. The chief additional matter is to be found in the Preface, chiefly devoted to combating the pretensions of Baehrens; in the addition to the recension of a collation of P, the liber Cujacianus of Scaliger; in the alteration of the text in a very few passages; and in some new addenda, in which certain emendations proposed by Mr. Munro, in his "Elucidations," and others, are mentioned and discussed. The companion volume, the English commentary, saw the light the year before last; and in saying that it is in every way worthy of the first volume, I am giving it the highest praise in my power.

To appreciate properly what Mr. Ellis has done for Catullus, it would be necessary to go back to the time when his first volume appeared. No English edition of this splendid poet then existed, and though several German editions had appeared, they were one and all defective, from ignorance on the part of the editors of the existence of the best MSS., and consequently an exaggerated estimate of the merits of those they were acquainted with. The two most ancient and most trustworthy MSS. of Catullus are the Codex Sangermanensis in the National Library at Paris (*G*), and the Codex Canonicianus in the Bodleian at Oxford (*O*). Although these MSS. are now awarded the palm, they have only recently been known to the learned. Sillig is said to have been the first to collate *G*, but the first publication of its readings to the world was made by Rossbach, in a Breslau programme of 1859; but this was inaccurate and scanty. Next followed Schwabe's collation, made for him by Dübner, in 1866. Then Mr. Ellis's diligent personal collation in 1867; and lastly, that of Baehrens, in 1876. Thus Mr. Ellis was the first who edited a personal collation of *G*.

The other MS., *O*, was not only first collated by Mr.

Ellis, but discovered by him lying unnoticed in the Bodleian, in 1867.

The antiquity of the MS. was at once recognised by Mr. Ellis: 'Hunc codicem aut antiquissimum habeo omnium qui nunc supersunt aut uno Germanensi inferiorem.' The discovery of *O* and the publication of its readings has revolutionised the criticism of Catullus. The last editor, Baehrens, building on the foundations laid by Mr. Ellis in 1867, has arrived at the conclusions that *O* is the best existing MS. of Catullus; that *O* and *G* alone were copied from the lost Veronese archetype (*V*); that the consensus of *G* and *O* gives us the readings of *V*; that all other existing MSS. were copied from *G*. These conclusions are very plausible, and may all be true: it is pretty certain, however, that without the aid of Mr. Ellis's *apparatus criticus*, they would have been attained to by Baehrens with much greater difficulty, if at all.

Mr. Ellis has supplied the reader with the means of judging for himself whether these conclusions of Baehrens are true or not. For it is only by comparison of readings in MSS. that those who cannot consult the originals can decide for themselves on the question of the value of MSS., or the derivation of one from another. Thus Mr. Ellis's collation would not be of the immense value it is, if it omitted the recent Datanus (1453), Lachmann's sheet-anchor, or the recent Cujacianus (1467), on which alone Scaliger based his recension, although these MSS. may be in themselves worthless.

It appears to me that there are two methods of critically editing a classical work—one is to give a collation of all MSS. that have any pretensions whatever; the other is to take the best MSS., and these alone, and toss all others, "quisquiliae, nugae," as Cobet would call them, to the winds. Both these plans have their merits. The former is by far the most difficult and laborious, but it is the most thorough. It is the foundation for the latter, which is the

simpler and easier of the two. Mr. Ellis proceeded on the former method; Baehrens on the latter. Accordingly, it did not fall in with Mr. Ellis's original plan to select and build upon any one or two MSS. as pre-eminently meritorious. He laid the foundation for all future editions of Catullus by his exhaustive collation. It was for himself in future editions, or for others, to build the superstructure.

I am sincerely sorry for the feud which exists between two such scholars as Ellis and Baehrens. The Codex *O* is the *causa belli*. Baehrens, discerning the pre-eminent claims of this codex, had written in his preface in a manner which did scant justice to the labours of Mr. Ellis; and Mr. Ellis has replied with most bitter objurgations. Among other things, Baehrens had claimed that his recension of *O* was much more accurate than that of Mr. Ellis, and went so far as to assert that wherever there was a discrepancy he, not Mr. Ellis, was to be trusted. Mr. Ellis shows us, by a list of passages, where he has again collated *O*, that this is not the case, and that he is often right, and Baehrens wrong. There is no doubt that Baehrens made some rash statements; and it is only natural that Mr. Ellis should be exasperated at seeing a discovery of his own appropriated by another; but the language in which Mr. Ellis speaks of Baehrens is too strong.

It is not so much in emendation of corrupt, nor in elucidation of difficult passages, that Mr. Ellis's merit is chiefly found. His judgment is, I think, often not correct as to the former, and his interpretations are occasionally, in my opinion, somewhat overstrained. But the *tout ensemble* of the work is magnificent. Its great merit is its completeness; everything is told the reader in the admirable prolegomena that is worth knowing about Catullus—his life, his poems, his critics, and editors; all that has been written worth mentioning, in the way of conjecture or comment, is presented in the notes to the first and second

volumes respectively. Mr. Ellis, in fact, supplies to his critic the means of criticising him ; and if he feels dissatisfied with any of the remarks that I am about to make, he may retort on me in the words of Medea—

Hoc ipsum, ingratus quod potes esse, meum est.

But he will not, I am sure, feel dissatisfied.

The task of reviewing Mr. Ellis is rendered comparatively easy by the appearance of Mr. Munro's " Criticisms and Elucidations of Catullus." This is one of the most interesting volumes that have ever been published. It has increased even the reputation of its author. It is from this book I have adopted the plan of this review. It would, in any case, be necessary to go over much the same ground, the difficulties of Catullus being well-known and salient points ; but the printing of the passages at length, with the brief analysis of criticism at the foot, the displaying of which has given so much interest to Mr. Munro's work, I have borrowed from him. I hope he will excuse the formal plagiarism. Like him and some previous editors, I call *V* the reading of that lost original MS. from which all existing copies are derived.

I.

Quoi dono lepidum novum libellum,
 Arido modo pumice expolitum ?
 Corneli, tibi : namque tu solebas
 Meas esse aliquid putare nugas,
 5 Iam tum cum ausus es unus Italorum
 Omne aevum tribus explicare chartis
 Doctis, Iuppiter, et laboriosis.
 Quare habe tibi quicquid hoc libelli,
 Qualecumque quod o patrona virgo
 10 Plus uno maneat perenne saeclo.

9. o om. *V*. Quidem pro quod *Itali* [*D La*¹]. quidem est patroni ut ergo, *Bergk*.
 quidem patronci ut ergo, *Munro*. Post *libelli* interpunxi.

The only change I have made in Mr. Ellis's reading of the ninth verse is transferring the stop from after *qualecumque* to after *libelli*, being led thereto by two remarks of Mr. Munro—first, that '*quicquid* and *qualecumque* can hardly come together without a connecting particle.' He quotes Tac. Ann., xiv. 55, '*quidquid illud et qualecumque tribuisset*,' and points out that the rhythm of Catullus will not admit of the addition of *et* after *libelli* proposed by older editors. Secondly, I am influenced by the line quoted by Mr. Munro from Martial, v. 60, 5, '*Qualiscumque legaris ut per orbem*,' where '*qualiscumque*' is at the beginning of the sentence. For these reasons I make the slight change in Mr. Ellis's reading which I have mentioned, and translate:—'Then take this little book, be it good or bad, which, O virgin mistress mine, I pray may live for more than one age, whatever its worth.'

'*Patrona virgo*' is certainly the Muse. Mr. Ellis very happily quotes Sulpicia, i. 11:—'*Musa precibus descende clientis, et audi*.' If the poet can be called the *cliens* of the Muse, the Muse may be called the *patrona* of the poet. But why *virgo*? Why did not Catullus say *patrona Musa*? asks Mr. Munro. Well, I suppose, simply because he did not choose. I think the line lxv. 2,

Et si me assiduo confectum cura dolore
Sevocat a *doctis* Ortale *virginibus*,

is sufficient to defend *virgo*. There *virginibus* is determined by *doctis* to mean the Muses. Here *virgo* is determined by *patrona* to mean the Muse. No other *virgo* could be understood to be a poet's '*patrona*,' and therefore there would be no ambiguity in the expression. Propertius goes farther than Catullus in using *virgines* absolutely for the Muses, without even a determining epithet, II. xxx. 33:—'*Nec tu Virginibus reverentia moveris ora*.' I therefore reject the ingenious

conjecture of Bergk, recorded by Mr. Ellis, and ably defended by Mr. Munro, 'patronei ut ergo,' 'that, for its patron's sake, it may last some ages.' Mr. Munro supports this from Martial's prose dedication of his eighth book to Domitian:—'Omnes quidem libelli mei, domine, quibus tu famam id est vitam dedisti, tibi supplicant, et puto propter hoc legentur.' He also compares the dedication by Statius of the second book of the *Silvæ*:—'Haec qualiacumque sunt, Melior carissime, si tibi non displicuerint, a te publicum accipiant;' and lastly, Martial's 'Festina tibi vindicem parare,' and 'Illo vindice nec Probum timeto.'

In spite of all these passages, I believe that 'o patrona virgo' was what Catullus wrote, and that Mr. Ellis is more than justified in retaining it in his text. The omission of *o* is a trifle in the MSS. of Catullus, but the changes demanded by Bergk's or Munro's reading are not trifles. And with regard to the meaning of the verses, nothing seems to me more like Catullus than his confident prayer to his Muse for immortality. Catullus well knew the value of his book, and it is forcing 'quicquid hoc libelli' to translate it, as Mr. Munro does, 'a sorry volume!' Martial and Statius were flatterers, and lived under a despotism and in an age of flattery, but Catullus was the reverse of a flatterer, and lived in a free state amid an outspoken public. Cornelius Nepos was a man on his own level, and Catullus dedicated his 'lepidus novus libellus' to him, not as a patron, but as a friend. For these reasons I am glad that Mr. Ellis keeps 'patrona virgo.'

II.

Passer, deliciae meae puellae,
 Quicum ludere, quem in sinu tenere,
 Quoi primum digitum dare adpetenti,
 Et acris solet incitare morsus,

- 5 Cum desiderio meo nitenti
 Carum nescio quid libet iocari,
 Et solaciolum sui doloris
 Cordi est, cum gravis acquiescit ardor,
 Tecum ludere sicut ipsa possem,
 10 Et tristis animi levare curas!
 Gratum sit mihi quam ferunt puellae
 Pernici aureolum fuisse malum
 Quod zonam soluit diu ligatam.

8. Credo ut, *V. cordi est scripsi. acquiescet libri.* 11. Tam gratum est *libri*
 gratum sit *scripsi.*

The seventh and eighth lines are thus given by Mr. Ellis:—

Et solaciolum sui doloris,
 Credo, et cum grauis acquiescit ardor—

taking *solaciolum* in apposition with *libet nescio quid iocari*. But, as he remarks, there is some harshness in this, and he thinks Lachmann may be right in making *solaciolum* a second nominative to *libet*. I do not think so: this would mix up a personal and impersonal construction. *Credo* is extremely awkward, and I believe corrupt, unless the transposition suggested by Mr. Munro be adopted. If the lines are not transposed, I think the substitution of *Cordi est* for *Credo et* makes everything smooth, ‘solaciolum’ being the nominative to ‘est.’ ‘Cordi est’ is several times used by Catullus, as xliv. 3: ‘quibus non est Cordi Catullum laedere: at quibus cordi est.’

But the transposition proposed by Mr. Munro gives very simple and natural:—

Credo ut cum gravis acquiescit ardor
 Sit solaciolum sui doloris.

The reader should refer to Mr. Munro’s admirable remarks

on the difference between 'dolor' and 'ardor,' passed over by the commentators generally. 'Ardor' is the hot tempest of passion: 'dolor,' the sadness or melancholy of love, when unhappy, or when the beloved object is absent. The passages quoted by Mr. Munro from the Latin poets amply bear out the distinction.

'The cold in clime are cold in blood,
 Their love can scarce deserve the name;
 But mine was like the lava flood
 That boils in Etna's breast of flame.'

That is *ardor*.

'Tis sad to think the days are gone
 When those we loved were near.'

That is *dolor*.

Mr. Ellis retains the Ms. reading of 11, 'Tam gratum est,' and supposes a hiatus of one line after vs. 10, like 'Tecum ludere sicut ipsa ludit,' so that 'ludere' would be the infinitive after 'est:' and the meaning would be, 'to play with Lesbia's sparrow *is* a pleasure as dear to me as the golden apples of Hippomenes were to Atalanta.' This does not harmonize well with 'Tecum ludere sicut ipsa *possem*.' As for the testimony of Alex. Guarinus, that a very old Ms. marked a great lacuna here, it is not worth much, nor are such vague references to unproduced witnesses generally valuable.

I have suggested 'Gratum sit' for 'Tam gratum est.' A copyist would think *tam* wanted before *quam*, and then, of course, *sit* must be changed to *est*, to make the line scan. But 'tam' is not, I think, necessary. The lines mean 'Could I but play with you as she does, and lighten the heavy cares of my heart, 'twould be as welcome to me as they say was to the swift-footed girl the golden apple that undid her zone so long fastened.'

The inappropriateness of the simile need not offend us, for it is to be noticed that the similes of Catullus, though always beautiful, are not always apt. There is more elaboration in the similes than suits the case illustrated. Take, for instance, that exquisite passage, *lxv. 17, seqq.*:-

Ne tua dicta vagis nequiquam credita ventis
 Effluxisse meo forte putes animo.
 Ut missum sponsi furtivo munere malum
 Procurrit casto virginis e gremio,
 Quod miserae oblitae molli sub veste locatum
 Dum adventu matris prosilit excutitur:
 Atque illud prono praeceps agitur decursu
 Huic manat tristi conscius ore rubor.

Here Catullus wants merely to illustrate forgetfulness of a friend's words. His simile, although most beautiful, is not particularly apt. But what a picture he makes of it! the apple slipping out of the bosom of a virgin, as she jumps up at her mother's entrance, and rolling along the ground; the conscious blush on the maiden's face as she stands confused before her mother! Compare also the simile in *lxiv.*, where the departure of the guests from the nuptials of Thetis is compared to the waves ruffled by the zephyr. It is developed into seven lines, and here again the beauty of the imagery, and not the pertinence of the details of the comparison, is to be noticed. Just so Catullus, when seeking for something to compare with the pleasure he would feel if he could sport with Lesbia's sparrow, presents us a simile which rather makes the reader pause to admire its own beauty, than helps to appreciate the thing to be illustrated.

In the pretty poem on the death of the sparrow, we learn from Mr. Ellis that the MSS. have the curious corruption—

Bone factum male bonus ille passer,

where the true reading is either

Vae factum male! vae miselle passer!

or,

O factum male! o miselle passer!

the former being Mr. Ellis's own reading and suggestion. I mention this merely to point out one of the worst instances of corruption of the MSS. of Catullus, though I shall notice several others *en passant*.

IV.

- 13 Amastri Pontica et Cytore buxifer
Tibi haec fuisse et esse cognitissima
- 15 Ait phasellus: ultima ex origine
Tuo stetisse dicit in cacumine,
Tuo imbuisse palmulas in aequore,
Et inde tot per impotentia freta
Herum tulisse, laeva sive dextera
- 20 Vocaret aura, sive utrumque Iuppiter
Simul secundus incidisset in pedem;
Neque ulla vota litoralibus deis
Sibi esse facta cum veniret a marei
Novissimò hunc adusque limpidum locum.
- 25 Sed haec prius fuere: nunc recondita
Senet quiete seque dedicat tibi,
Gemelle Castor et gemelle Castoris.

I will not write at length on the poem about the phaselus, enough having been said about it by others already. 'Horridamque Thraciam Propontida' must, as Mr. Munro points out, be 'the rough Thracian Propontis;' and Mr. Ellis, in his next edition, must remove the comma after 'Thraciam,' and make it the adjective, as he seems ready to do, to judge from his commentary, the classical form of the noun being generally *Thrace* or *Thraca*, and

'horridam Thraciam Propontida' being exactly co-ordinate with 'trucem Ponticum sinum.' Mr. Ellis and Mr. Munro are at issue as to the port where Catullus got on board his yacht, Mr. Ellis supposing it to have been Amastris or Cytorus, on the Euxine, while Mr. Munro supposes it to have been a port, perhaps Cios or Myrlea, on the Propontis, more convenient to Nicaea, the capital of Bithynia, which Catullus left in 56 B. C. The only evidence we have on this point are the lines—

Tuo imbuisse palmulas in aequore,
Et inde tot per impotentia freta
Herum tulisse.

What is meant by 'tuum aequor'? Surely, the Euxine. 'Inde' will then mean 'from the Euxine,' for there is nothing to refer 'inde' to except 'aequore.' I thoroughly agree with Mr. Ellis, that 'inde' is 'local': 'from thence,' and not 'next,' as Mr. Munro makes it. That the port Catullus left was, however, not Amastris or Cytorus is, I think, shown by the words 'tuo imbuisse palmulas in aequore'—'it hanselled its blades in thy water'—it took its first trip before Catullus was on board, down to the port where he embarked; while that it was in or near the Euxine is shown by 'inde.' This view is not, I think, inconsistent with Mr. Munro's as regards the port, the Propontis being sufficiently near the Euxine for a person starting from the former to say vaguely that his barque had carried him from the Euxine.

Mr. Munro thinks Lachmann a 'Berliner landlubber,' for suggesting 'vagaret' for 'vocaret' in v. 20. I agree with him in this. No yachtsman could mistake the meaning of 'laeva sive dextera vocaret aura.' Suppose the ship was going westward, it sailed just as well with a north wind as a south wind: of course, sailing on the port or starboard tack with the same wind, as Sir H. Thring

explained the words to Mr. Munro, is included in the meaning.

'Sibi,' in v. 23, Mr. Ellis says, means 'offered up *by* the phasellus.' Mr. Munro formerly translated it '*for* her,' regarding the other translation as a hyperbole of personification, but he seems willing now to accept 'by her,' and for the dative quotes Catullus himself, xxxvii. 13—'Pro qua mihi sunt magna bella pugnata.' *By* is undoubtedly right, and not *for*. Cf. Prop. ii., 9, 25,

'Haec mihi vota tuam propter suscepta salutem.'

Mr. Munro is again at issue with Mr. Ellis and other editors as to the reading and meaning of v. 24. All editors, in Mr. Munro's opinion, who change *nouissime* of the Ms. to *nouissimo* 'spoil Catullus.' I cannot agree with Mr. Munro here. The arguments for the vulgate, retained by Mr. Ellis, are overpowering. First, the archetype does *not* give *a marei nouissime*: it gives the corrupt *amaret nouissime*, and if *a marei* was altered to *amaret*, *nouissimo*, having nothing to agree with, would quickly be altered to *nouissime*. Secondly, as Mr. Munro himself points out ten times over, *o* and *e* were almost equivalent in the Catullian archetype. Thirdly, the epithet *novissimus* as applied to very distant seas was almost a commonplace in Latin, as shown by four passages cited by Mr. Ellis in his first volume, the Euxine being indicated by this expression in Ovid, Trist. iii. 13, 27. Fourthly, the natural meaning of vv. 22, 23, 24, is against Mr. Munro—'She denies that any vows were offered up by her to the gods of the shore, when travelling from the farthest sea, all the way to this limpid lake.' Here the force of the contrasting phrases, *nouissimo* and *usque ad*, is destroyed by Mr. Munro's interpretation. I am aware that I have not fully stated Mr. Munro's arguments, which the reader will find urged with characteristic force in his 'Elucidations,' pp. 13-24;

but they have not convinced me. On *senct*, in v. 26, Mr. Ellis says it is an archaic word, found in the fragments of Pacuvius and Attius; and in his first volume he quotes from three grammarians—Charisius, Diomedes, and Priscian—all of whom refer to this verse from Catullus for this archaic form. I observe that Conington, following Jahn, appears, in Persius, vi. 6, ‘Egregius lusisse senes,’ to take *senes* as the verb, but the recognised rarity of the word would seem to be against this. Mr. Ellis forces the meaning of ‘gemelle Castor et gemelle Castoris,’ as Mr. Munro has shown.

VI.

7 Nam te non viduas iacere noctes
Nequiquam tacitum cubile clamat.

‘Nequiquam tacitum’ is, in my opinion, rightly explained by Mr. Ellis, ‘in spite of its natural silence.’ Mr. Munro, however, makes *tacitum* the passive participle, and takes it in apposition with the preceding verse—‘a fact vainly concealed by you.’ I wish that the author of the gnome ‘hypotheses non fingo’ had added a second, ‘parentheses non fingo.’ Mr. Munro is rather fond of parentheses—witness his (*oppidum est pusillum*), in liv. 1; his (*quaque alia*), in lxiv. 16. He states, in his remarks on liv. 1, that parentheses are a marked feature of most Latin styles. But of the twelve parentheses cited (note ad Lucr. iii. 790), nine are introduced by *enim*, one by *etiam*, one by *nam*, and one by *quippe*. His explanation of ‘tacitum’ as a passive participle reminds me of his explanation of ‘subitam’ in Lucr. iii. 263, where again, in my opinion, he prefers the unnatural to the natural, the passive participle to the adjective. The adjective is here wanted. It was the suddenness of the loss of the calf, the utter unexpectedness of the blow, that crushed and bewildered the poor cow. Virg. *Æn.* iv. 418:

Hunc ego si potui tantum sperare dolorem,
Et perferre, soror, potero.

Thuc. ii. 61 :

δουλοῖ τὸ φρόνημα τὸ αἰφνίδιον.

Eur. Med. 225 :—

ἐμοὶ δ' ἄελπτον πρᾶγμα προσπεσὺν τόδε
ψυχὴν διέφθαρκ'. οἴχομαι.

Ezek. xxiv. 16 :—

'Son of man, I take away the desire of thy eyes *with a stroke*.'

'Subitam,' the participle, 'that has entered into her,' is the prosiest prose: 'subitam,' the adjective, is the essence of poetry.

VI.

11 Nam nil stupra valet nihil tacere.
Cur? non tam latera ecfututa pandas,
Nei tu quid facias ineptiarum.

12. Nam in (or ni) ista preualet, *V.* Nam ni stupra, *Scaliger.* Nam nil, *Haupt.* Mani stupra vales, *Munro.* Nam mi, a writer in *Class. Journ.*, xxiv., p. 211.

Stupra seems certain, but the beginning of the line is uncertain. All honour to Mr. Munro for his clever *Mani*. It certainly suits the MSS. very well, and the corruption *Nam ni* is closely paralleled, as he has pointed out, by the corruption of *Nam murram*, xxix. 3, for *Mamurram*; *omnem mi* for *o Memmi*, xxviii. 9. It is to be regretted that we have no confirmation of the suggestion that the praenomen of this Flavius was Manius. There also seems a certain abruptness in *Mani*. On the other hand, I do not like Haupt's reading. It is not defended by xvii. 21, 'nil videt, nihil avdit,' which Mr. Ellis quotes, nor by xlii. 21, 'Sed nil proficimus, nihil movetur.' These verses show

that *nil* and *nihil* may indeed be used in the same line; they do not show that they can both be the nominative to one and the same verb. I think,

Nam ista stupra valet nihil tacere

may be right. *Ista* and *stupra* got mixed up together. In favour of *ista*, I would remark that some word of that sort is wanted. Catullus has been examining testimony afforded by the condition of the *lectus*, and turns to his friend himself, and as he looks at his self-detecting figure, finds additional evidence there. Pointing to him, he says: 'Nothing can hide those amours of yours! Why! You yourself would not have your present appearance unless you were playing some pranks!' cf. xiii. 11.

VIII.

I will print this beautiful poem at length, for the delectation of the reader, that he may enjoy it in the type of HERMATHENA as he has in other types.

- Miser Catulle, desinas ineptire,
Et quod vides perisse perditum ducas.
Fulsere vere candidi tibi soles
Cum ventitabas quo puella ducebat
5 Amata nobis quantum amabitur nulla.
Ibi illa multa tam iocosa fiebant
Quae tu volebas nec puella nolebat.
Fulsere vere candidi tibi soles.
Nunc iam illa non vult: tu quoque impotens noli,
10 Nec quae fugit sectare nec miser vive,
Sed obstinata mente perfer obdura.
Vale puella. iam Catullus obdura.
Nec te requiret nec rogabit invitam.
At tu dolebis cum rogaberis nulla,
15 Scelestas, nocte. Quae tibi manet vita!

Quis nunc te adibit? cui videberis bella?
 Quem basiabis? cui labella mordebis?
 At tu Catulle, destinatus obdura.

6. tum, *V.* tam, *Scaliger*. 9. impote, *V.* impotens noli, *Avantius*. 15. ne te, *V.* nocte, *Statius*. vae te, *Balthazar*, *L. Mueller*, *Baehrens*, *alii*, *puncto post nulla posito*.

This great poem was written by Catullus when in the same mood that inspired the finest of all his poems, 76, while staggering under the huge wound, the *καίρια πληγή*, produced by abiding love for a faithless woman. It presents few difficulties, and Mr. Ellis has shown good judgment in their treatment. I think, though I am not sure, that *tam*, was written by Catullus in 6, and not *tum*: 'impotens *noli*,' in 9, is rightly adopted by Mr. Ellis, instead of Scaliger's 'impotens *ne sis*'; and, although he has not gone so far as I could have wished in 15, and boldly read *nocte*, yet he has been content with obelising *ne te*, and has not been led into coquetting with the abominable *vae te* adopted by the latest editors.

I regret to see that Mr. Munro patronises the reading 'cum rogaberis nulla,' although he does not say what reading he sanctions for *ne te*.

The emendation *nocte* appears to me certain, and the only reason for its not being universally accepted must be the fact that it is so easy and obvious. But the fact that a restoration is easy is not always an argument against it. It certainly is not in the Mss. of Catullus. There are many cases of corruption in these Mss. where the correction is undoubted and certain, and where it is obviously foolish to reject the easy, and go hunting for the obscure. For instance, take lxiv. 307, 308. Here Mr. Ellis properly reads—

His corpus tremulum complectens undique vestis
 Candida purpurea talos incinxerat ora.

Nothing could be more simple, or in my opinion more certain, than this reading. *Vestis* is a correction as old as the edition of Parthenius, 1485, for *questus* or *q̄stus* of the MSS., a certain correction; and *talos* is also an old correction for *tuos*. But the simplicity of this reading must have displeased some critics, for the lines appear in this portentous shape in Doering, from Vossius—

His corpus tremulum complectens undique quercus
Candida purpurea quam Tyro incinxerat ora.

No one will deny this reading the merit of difficulty. Mind, there is no finite verb.

As for the corruption *ne te*, it must have arisen, mainly, from the copyist taking *te* in *nocte* as the pronoun. So *unguentate* is written in many MSS. *unguenta te*, in lxi. 142; and I believe *qui te*, in lxvii. 12, may be a corruption of *quiete*, and *cum te*, in xxix. 4, is *ante*.

X.

Varus me meus ad suos amores
Visum duxerat e foro otiosum,
Scortillum, ut mihi tum repente visum est,
Non sane illepidum neque invenustum.
5 Huc ut venimus, incidere nobis
Sermones varii, in quibus quid esset
Iam Bithynia, quo modo se haberet,
Et quonam mihi profuisset aere.
Respondi id quod erat, nihil neque ipsis
10 Nec praetoribus esse nec cohorti
Cur quisquam caput unctius referret,
Praesertim quibus esset irrumator
Praetor, nec faceret pili cohortem.
'At certe tamen' inquiunt 'quod illic
15 Natum dicitur esse, comparasti

- Ad lecticam hominis.' Ego, ut puellae
 Unum me facerem beatiorem,
 'Non' inquam 'mihi tam fuit maligne,
 Ut, provincia quod mala incidisset,
 20 Non possem octo homines parare rectos.'
 At mi nullus erat neque hic neque illic,
 Fractum qui veteris pedem grabati
 In collo sibi collocare posset.
 Hic illa ut decuit cinaediorum,
 25 'Quaeso' inquit 'mihi, mi Catulle, paulum
 Istos commoda: nam volo ad Sarapim
 Deferri.' 'Mane' inquit puellae:
 'Istud quod modo dixeram me habere,
 Fugit me ratio: meus sodalis
 30 Cinna est Gaius: is sibi paravit.
 Verum, utrum illius an mei quid ad me?
 Utor tam bene quam mihi pararim.
 Sed tu insulsa male ac molesta vivis
 Per quam non licet esse negligentem.'

8. Ecquonam, *Statius*. 10. quaestoribus, *Muretus*. 13. nec, *O.* non, *al.* nec, *G.* 26. comodā, *O.* 27. mane me, *V.* mane, *Guarinus*, *alii.* memini, *Munro*, et ita ipse conieceram. 32. pararim, *V.* paratis, *Statius*. 33. talsa, *O.* tu insula, *G.* mulsa, *Baehrens*.

This poem, which is on the whole the best specimen of Catullus' light, free, and easy style, was written after his return from Bithynia, whither he had gone on the staff of the praetor Memmius. If he expected to replenish his pockets in the train of that profligate he was grievously disappointed. Mr. Ellis rightly supposes that Varus' mistress was sick (or convalescent), as shown by the phrase 'visere ad,' which is commonly 'to visit some one who is ill'; hence 'the visit to the temple of Serapis would be to implore a cure'—perhaps to return thanks for her convalescence. I cannot think Mr. Ellis right in preferring *non*, in v. 13, to *nec*. *Nec* is the reading of *O*, and a variant

in *G*, and there is great difficulty in the translation, which is entirely removed if we accept *nec* with the new punctuation proposed by Mr. Munro. Mr. Ellis's own translation shows the awkwardness of his reading—'I replied, as was in fact the case, that neither natives, praetors, nor staff, *had any reason to make a man expect* to return with his locks in better trim.' I think the copyists thought that something of that sort was the meaning, and hence arose the false reading *in* before *ipsis*, which is found in most MSS., 'there was no reason to be found in the provincials, &c., why.' But *cur* does not depend on *esse*, and *ipsis*, *praetoribus*, and *cohorti* are possessive datives, and the copyist misunderstood the construction. Mr. Munro reads:

Respondi id quod erat, nihil neque ipsis
Nec praetoribus esse nec cohorti.
Cur quisquam caput unctius referret?
Praesertim quibus esset irrumator
Praetor, nec faceret pili cohortem.

If anyone has doubts on the point, they will probably be removed by referring to the list of passages quoted by Mr. Munro with remarkable felicity from Caesar (p. 32). I think, however, *quaestoribus* is a very probable correction for *praetoribus*.

The pun in v. 23 is repeated from Plautus, as Mr. Ellis points out, Asin. iii. 3, 67, hic istam *colloca* cruminam in *collo* plane. 'Minx' (Munro) is just the word for 'cinaediorum,' not, I think, 'delicate creature' (Ellis).

The shortening of the final syllable in *commodā* has given great offence to the learned. I believe it is what Catullus wrote, and I am grateful to Mr. Ellis for retaining it, although in his commentary he speaks with diffidence as to its soundness. It has excellent MS. authority, being given by *G* and the majority of the other MSS. *O* has *comodā*. Moreover, it is exactly, in sense, the word

wanted. 'Lend me them for a while' is what the girl should say, and no other reading gives sense at all approaching this. The word, then, being *à priori* the word wanted, when we find in Plautus, Cist. iv. 2, 76, as quoted by Mr. Ellis and others :

Commoda loquellam tuam : tibi nunc proderit confitemur,

it does not seem a mere coincidence that here too the final syllable appears short. It probably really *was* short in the pronunciation of the vulgar. Borrowing is, unfortunately, a very common thing, and 'commoda' became a common colloquial expression, and, like certain other colloquial expressions, became, in vulgar parlance, emancipated from ordinary rules. The imperatives *amă, rogă, pută*, are referred to by Mr. Ellis.

Mr. Munro simply says "'*commodă nam*' is impossible in Catullus," and in the next line says of '*maně me*' that it is 'surely not admissible in Catullus.' He adopts Hand's '*commodum enim*,' a very bad reading, in my opinion. Now I think Catullus *may* have said *maně me*, mimicking, or adapting himself to, the vulgar pronunciation of 'commodă' by the lady : and the codices are unanimous for *mane me* ; the shortening of the *ě* being shown possible by Mr. Ellis in common talk, I think, by the examples of imperatives of the second conjugation so used in Plautus. The sense, however, is not so good as simply *mane*, 'wait,' not 'wait for me,' although the latter is intelligible, and *mane inquit*, or *inquit*, is good metre, as Mr. Munro says. Bergk's suggestion, *mi anime*, seems to me worthless, although Mr. Ellis speaks well of it, and Mr. Munro calls it 'enticing.' I had suggested *memini* to Mr. Ellis, and I find the same conjecture has occurred to Mr. Munro : he translates the passage thus :—'Now I bethink myself, when I said just now that I had them, I forgot myself for the moment : my dear friend

Gaius Cinna, he it was who bought them.' But *memini* is perhaps, after all, a trifle abrupt without an introductory particle, and its general use is rather 'I have not forgotten' than 'I recall to mind.'

I think that Mr. Munro is right in defending *paratis* in v. 32 for *pararim*, the difficulties in the way of the latter reading being *quam* used for *quam si*, and the wrong tense, *parassem* being required. 'Stattius' *paratis*,' says Mr. Munro, 'is not so violent a correction as some might at first sight think it to be; for final *m* and *s* are perpetually interchanged in our MSS. . . . If *paratim*, then, a non-existent word, were once written it would pass immediately into *pararim*: for *r* and *t* were also not easily distinguished in our archetype.'

XI.

- Furi et Aureli comites Catulli
 Sive in extremos penetrabit Indos
 Litus ut longe resonante Eoa
 Tunditur unda,
 5 Sive in Hyrcanos Arabesque molles,
 Seu Sacas sagittiferosve Parthos
 Sive quae septemgeminus colorat
 Aequora Nilus,
 Sive trans altos gradietur Alpes,
 10 Caesaris visens monimenta magni,
 Gallicum Rhenum horribilesque ultimisque
 Britannos,
 Omnia haec quaecumque feret voluntas
 Coelitum temptare simul parati,
 15 Pauca nuntiate meae puellae
 Non bona dicta.
 Cum suis vivat valeatque moechis,
 Quos simul complexa tenet trecentos
 Nullum amans vere sed identidem omnium
 20 Ilia rumpens :

Nec meum respectet ut ante amorem,
 Qui illius culpa cecidit, velut prati
 Ultimi flos, praetereunte postquam
 Tactus aratro est.

11 *ita codd., praetor O qui habet* Vitimosque. horribilem insulam ultimos-
 que Britannos, *Ellis.* horribile aequor, *Haupt.* horribilem salum, *Munro.*

The 11th and 12th verses are the only ones which present any difficulty as to the reading. I have printed them according to the MS. reading. All the emendations made are faulty, in that none of them preserve the *que* in *horribilesque*. Mr. Munro indeed says it is probable that *que* was a clumsy interpolation to help the metre; and he thinks that *horribilem salum* may be the true reading. Haupt also thinks that the sea was the horrible object referred to, and reads *horribile aequor*. Mr. Ellis's reading—

Gallicum Rhenum, horribilem insulam ultimosque Britannos—

is objectionable on two grounds. First, the position of the words: secondly, the application of the epithet *horribilem* to our beautiful island, the coveted spoil of Roman, Saxon, Dane, Norman, Dutchman, and Spaniard. It is forcing it to make it apply to the inhabitants, I think. They were *horribiles* verily, and this is, I think, what Catullus intends to say. Just as Caesar said of them: 'omnes vero se Britanni *vitro* inficiunt quod coeruleum efficit colorem, atque hoc *horribiliores* (or *horridiores*) sunt in pugna aspectu,' B. G. V. 14. I think Catullus may have had this very passage in his eye, and I believe he intended to describe the grim and fierce appearance of the Britons. I propose, keeping pretty close to *O*, and preserving the *que*:

Gallicum Rhenum horribilesque vitro in-
 usque Britannos,

all the way to the Gallic Rhine, and the Britons horrible

with woad.' *O* gives *vitimosque*, a sort of compromise between what I suggest as the true reading and *ultima*, which the other MSS. were ready to adopt, *ultima* being a commonplace. In cxvi. 4, where *Ca* uses *inusque* (in another sense), it is corrupted to *in*. *Avienus* uses it in the sense required here: *Porrigit* in *usque* *Thetim*. *De ora Marit.* 525. I might have simply *usque*, which would be very like *Cic. Quint.* *Galliam et trans Alpes usque transfertur*. But *Catullus* prefers synaphia here. *Visu* and *vultu* seem also worthy of consideration.

The pathos in the last stanza is inimitable. I am rather surprised to read Mr. Munro's remark that it is 'worthy of Burns.' I am a great admirer of Burns; but I doubt if he ever wrote anything approaching *Catullus* here. Mr. Theodore Martin well points out 'the admirable suggestion in the word *tactus* of the contrast between the fragile flower and the weight and force of the plough, the mere touch of which is fatal to it.'

Mr. Ellis well illustrates the use of *ut* in v. 1, for 'where,' from *ὡς* in *Theocritus*:

ὡς τὸ κάταντες τοῦτο γέωλον αἶ τε μυρῖκαι.

He explains *aequora*, in v. 8, of the plains of Egypt, not the sea, quoting *Verg. G. iv.* 291: *Et viridem Aegyptum nigra fecundat arena*. He may be right, but the other interpretation given by *Doering* is very natural, and at any rate worth mentioning: 'aqua lutosa, qualem fere vehi Nilus ex agris inundatis relabens, colorem inducit mari al aqua marina diversum.'

XII.

- Marrucine Asini, manu sinistra
 Non belle uteris in ioco atque vino :
 Tollis lintea negligentiorum.
 Hoc salsum esse putas ? fugit te, inepte :
 5 Quamvis sordida res et invenusta est.
 Non credis mihi ? crede Pollioni
 Fratri qui tua furta vel talento
 Mutari velit : est enim leporum
 Disertus puer ac facetiarum.
 10 Quare aut hendecasyllabos trecentos
 Expecta, aut mihi linteum remitte,
 Quod me non movet aestimatione,
 Verum est mnemosynum mei sodalis.
 Nam sudaria Saetaba ex Hiberis
 15 Miserunt mihi muneri Fabullum
 Et Veranius : haec amem necesse est
 Ut Veraniolum meum et Fabullum.

8. mutari, *V*, perhaps multari. 9. differtus, *Passerat*. ducentum, *Munro*.
 14. exhibere, *V*. ex Hiberis, *vulgo*. 16. et *V*, *Ellis*. ut, *vulgo*.

The Asinii, says Mr. Ellis, came from Teate, the chief town of the Marrucini. Mr. Munro has, I think, made it appear very probable that the cognomen adopted by the elder son was Marrucinus, not Pollio. The elder brother was a sneak, and thought stealing napkins a good practical joke, to the intense disgust of the younger brother, Asinius Pollio, whose later life seems to have fulfilled the high promise held out by his generous youth. If *mutari*, in v. 7, is sound, the meaning must be that Pollio would gladly give a talent, if by so doing he could make his brother an honest man. This gives excellent sense, and I think Mr. Ellis is justified in retaining *mutari*. But a word may be said in favour of *multari* (not of Baehrens' *fuste lento multari*, or Pluygers' *vite lenta multari*, for these are

reckless changes); but *talento multari*, 'to be fined a talent,' is very likely to be right. Plautus has *multabo mina*, Trin. III. ii. 82. *Vel* would mean 'even as high as a talent.' *Multare* and *mutare* of course are frequently confounded in MSS.

Both Mr. Ellis and Mr. Munro refuse to allow that *leporum* and *facetiarum* can be genitives of quality without an epithet. And *differtus* 'crammed with,' suggested by Passeratius, being always, I believe, used with an ablative, and giving a very heavy meaning to this lightsome verse, must be at once condemned. Mr. Munro comes to the rescue with what I think is, on the whole, the most brilliant of his conjectures on Catullus, *ducentum*, the parallel between the verse and Horace's *centum puer artium*, being very striking. It is the only emendation of the passage that has any probability. I suppose we could hardly, keeping *diser-tus*, translate 'the eloquent child of pleasantry and wit,' like 'Aureli pater esuritionum,' xxi. 1, 'father of fastings.'

Mr. Ellis keeps unnecessarily close to the MSS. in reading *ex Hibere* 'from the Ebro,' v. 14, the MSS. giving *exhibere*, although in his commentary he thinks *ex Hibereis*, the ordinary reading, may be right. It surely is right. It is unnecessary to press the MSS. too closely, when we have a satisfactory theory to account for a corruption. In the present case the copyist thought he saw part of *exhibeo* before him, and it is needless to suppose he saw the exact letters of *exhibere*. Many a true reading has thus been spoilt. For instance, in Propertius, II. v. 4,

Et nobis *alio* Cynthia ventus erit,

where all the MSS. give *aquilo* on account of the proximity of *ventus*, *Aquilo* was long ago changed by Scaliger to *alio*, a certain correction. 'I'll make for some other port,' *alio* being defended by many other passages, such as II. xv. 35 :

Quam possim nostros *alio* transferre dolores.

But recent editors all spoil the line, by needlessly pressing the MSS., and reading *aliquo*, which is nonsense.

Ut, the common reading in the last line, appears right. But Mr. Ellis always errs on the right side in retaining the MSS. readings, if at all capable of defence, while conscientiously recording the proposed changes. The reader always is sure of the ground he is treading on; and this constitutes a growing charm to diligent students of Mr. Ellis's edition.

It is impossible in a review of this nature to do justice to the mass of learning displayed by Mr. Ellis in his commentary. It is necessary to study Catullus thoroughly, to thoroughly appreciate the amount of assistance given in the way of quotations from other authors to illustrate the poet. I will, however, give a few instances as I go through the poems: for example, at that admirable passage where Catullus contemptuously avows his poverty, xiii. 5, 6,

——— nam tui Catulli
Plenus sacculus est araneorum,

Mr. Ellis compares: 'Od. xvi. 35, of Odysseus' couch, *Χήτει ἐνευναίων κάκ' ἀράχνια κείται ἔχουσα*. Cratin. ap. Meineke Com. Frag. ii. 129, *ἀραχνίων μιστήν ἔχει τὴν γαστέρα*. Aul. i. 2, 156, *Nam hic apud nos nihil aliud est quaesti furibus. Ita inaniis sunt oppletæ atque araneis*. Afran. 412, Ribb. *tanne arcula Tua plena est araneorum?*'

Again, on verse 13 of the same poem,

Quod tu cum olfacies, deos rogabis
Totum ut te faciant, Fabulle, nasum,

Mr. Ellis reminds us of Ben Johnson's invitation, Cynthia's Revels, v. 2: 'You would wish yourself all nose for the love on't.'

XIV.

Calvus, the orator and poet, sent Catullus a present at the Saturnalia, a volume containing a collection of trashy poets, and this poem is written in playful remonstrance :

Dii magni horribilem et sacrum libellum !
 Quem tu scilicet ad tuum Catullum
 Misti, continuo ut die periret,
 Saturnalibus, optimo dierum !
 Non non hoc tibi, salse, sic abibit :
 Nam si luxerit, ad librariorum
 Curram scrinia, Caesios, Aquinos,
 Suffenum, omnia colligam venena
 Ac te his suppliciis remunerabor.

What is the meaning of *continuo*? In my opinion it must be joined with *die*, meaning on 'the approaching day.' The passages cited by Mr. Ellis from Ovid show the use of *continuus* (or *continua*) *dies*. Fast. v. 732 :

Auferet ex oculis veniens Aurora Boöten
 Continuaque die sidus Hyantis erit.

Fast. vi. 720 :

At pater Heliadum radios ubi tinxerit undis
 Et cinget geminos stella serena polos :
 Tollet humo validos proles Hyriea lacertos
 Continua Delphin nocte videndus erit.

I have cited these passages at length, because it was necessary in order to show the exact meaning of *continuus* (*continua*) *dies*, *continua nox*. *Continuus* (*continua*) *dies* means, I fancy, the day following the night : *continua nox*, the night following the day. This is the case in both the Ovidian references. You could not say in the middle of the day, that the next day would be *continuus dies*, because the night would come between, and break the continuity (of course you could say so if you regard the day as con-

sisting of twenty-four hours, not as determined by light). Now this is exactly the meaning here. Catullus apparently has received his Christmas box while it is still dark, on the early morning of the Saturnalia, as is shown by the words *si luxerit*; and he dreads perishing *continuo die*, on the day immediately following, *Saturnalibus optimo dierum*. Mr. Ellis does not remark on this use of *continuus* applied to *dies*, nor does Mr. Munro, who says, erroneously, I think, '*continuo* can only have the sense it so often has in the old idiomatic writers: at once, without an interval, straight on end.'

XXII.

- Suffenus iste Vare quem probe nosti,
 Homo est venustus et dicax et urbanus,
 Idemque longe plurimos scribit versus.
 Puto esse ego illi milia aut decem aut plura
 5 Perscripta, nec sit ut fit in palimpsesto
 Relata: cartae regiae, novei libri,
 Novi umbilici, lora rubra, membranae:
 Derecta plumbo, et pumice omnia aequata.
 Haec cum legas tu, bellus ille et urbanus
 10 Suffenus unus caprimulgus aut fossor
 Rursus videtur: tantum abhorret ac mutat.
 Hoc quid putemus esse? qui modo scurra,
 Aut siquid hac re tritius videbatur,
 Idem infaceto est infacetior rure,
 15 Simul poemata attigit, neque idem unquam
 Aeque est beatus ac poema cum scribit:
 Tam gaudet in se, tamque se ipse miratur.
 Nimirum idem omnis fallimur, neque est quisquam,
 Quem non in aliqua re videre Suffenum
 20 Possis. Suus cuique attributus est error:
 Sed non videmus manticae quod in tergo est.

7. membranae, *Codices et Munro*. membrana, *Avantius, editores omnes*.

13. tristius, *V*. tritius, *vulgo*. tersius, *Munro, Baehrens*. strictius *coni., Ellis*.

4 'In palimpsesto relata,' 'jotted down on palimpsest,' Mr. Munro denies that the ablative with *relata* is Latin, and would read *palimpsestos* with Baehrens (*palimpseston*, Lachmann). No doubt *in codicem referre* is the regular phrase; and although the ablative is found in a passage quoted by Mr. Ellis from Cicero, Rosc. Com. ii., 'non habere se hoc nomen in codice accepti et expensi relatum confitetur,' I will not adduce that passage in support of the ablative here, because *habere* evidently influences the construction. But scribbling verses *on* palimpsest is a very different thing from making entries *in* a ledger. And just as Cicero, quoted by Mr. Ellis, has 'in deorum numero referre,' N. D. i. 12, 29, in a different sense from the technical one, so, I think, Catullus may use the ablative here. I do not know whether Mr. Munro would read *numerum* here. He insists on reading *codicem* in the other passage, saying: 'no editor, I think, would retain '*in codice*' with '*in codices*' and '*in codicem*' almost in the same sentence.' A careful consideration of the passages has, however, convinced me that *codice* is sound in the one place where it occurs. The accusative occurs four times in the first three chapters of the oration:

- (1). Non refert parva nomina in codices?
- (2). quod nomen referre in tabulas debeat?
- (3). quod in codicem iniuratus referre noluit.
- (4). in codicem acceptum et expensum referri debuit.

The ablative occurs once, as above quoted, and the construction is evidently somewhat different from all these passages. I believe *palimpsesto* is what Catullus wrote. *Renata* would be more likely, I think, than Mr. Munro's *artata*, but an emendation is unnecessary.

Mr. Munro has shown that *membranae*, the reading of the MSS., is right. Mr. Ellis rightly explains *membrana* as the parchment wrapper or envelope of the roll, but read-

ing the singular, and joining the words to what follows, he and all editors since Avantius 'bring hopeless confusion' into the passage, says Mr. Munro. For it was the *page* of the book that was always ruled with lead lines, *derecta plumbo*, not the wrapper. Mr. Munro puts a full stop at *membranae*, and prints the two next lines thus:

Derecta plumbo et pumice omnia aequata
Haec cum legas tu, bellus ille et urbanus, cet.,

joining *derecta* with *haec*—much too violent a trajection for Catullus, in my opinion. I do not see why we should not read *membranae*, and adopt the punctuation I have given. This seems a less violent construction; by it *derecta* is referred back to *relata*. 'His verses are ruled with lead, and the whole concern is evened with pumice.' I do not refer *omnia* solely to the verses or to the page, but to all parts of the book to which pumice was usually applied. This vague use of *omnia* is extremely common, as in such phrases as 'lacrimis omnia plena madent,' etc.

I think the vulgate *tritijs* in v. 13 is more likely than Mr. Munro's *tersius* (or *tertijs*). I think the expression 'tritas aures,' Cic. Fam. ix. 16, 4, referred to by Mr. Ellis, is quite apposite; and the derivatives of the Greek *τρίβω*, *τρίμμα*, *περίτριμμα*, etc., used of sharp, tricky knaves, to some extent enhance the probability that the corresponding Latin verb may have been used in a sense not very far removed from this. For *scurra* means the 'man about town,' opposed to the clownish rustic.

XXV.

Cinaede Thalle mollior cuniculi capillo,
Vel anseris medullula vel imula oricilla,
Idemque, Thalle, turbida rapacior procella
5 Cum diva †mulier aries ostendit oscitantes,
Remitte pallium mihi meum quod involasti,

Sudariumque Saetabum, catagraphosque Thynos,
 Inepte quae palam soles habere tanquam avita.
 Quae nunc tuis ab unguibus reglutina et remitte,
 10 Ne laneum latusculum manusque mollicellas
 Inusta turpiter tibi flagella conscribillent,
 Et insolenter aestues velut minuta magno
 Deprensa navis in mari vesaniente vento.

5. diua mulier, *V.* aries, *O.* alios *al' aues vel aries*, *G.* ostendet, *O.* ostendit, *G.* cum diua muta gavius *coni.*, *Ellis.* conclave cum vicarios, *olim coni.*, *Munro*, *nuper autem* cum diua mi vicarios *vel* cum diua Murcia atrieis. cum dira vinulentes, *Bachrens.* *ipse conieceram* simul Laverna vernulas. 11. insula, *V.* inusta, *Calpurnius.* 12. inimica, *V.* minuta, *Itali.*

The fifth line in this poem is 'a notorious Catullian crux,' as Mr. Munro calls it. It is evident that in it the occasion is described when the meek and mild Thallus shows himself in his character of a rapacious thief, and that all the emendations which have supposed the line to refer to *procella* are wrong at the outset. With regard to Mr. Ellis's clever conjecture—

Cum diua muta gavius ostendit oscitantes—

I can only at present refer the reader to his elaborate and erudite *excursus* in vol. i., quoting his commentary as to the meaning: "And yet, at the same time, Thallus, more greedy than a sweeping tornado, when some chance shows you your victims off their guard." . . . "Following Bergk's conjecture—*cum diua multiens aves*, I suggested *cum diua muta gavius*, 'when the silent goddess (either the goddess of thieves, Laverna or Larunda, or perhaps Angerona, ἡ θεὸς τῆς βουλῆς καὶ καιρῶν) shows you the gulls (the simpletons that indicate your presence, as sea-gulls indicate a storm) agape, and ready to be pilfered.'" Mr. Munro's two latter conjectures follow up the same idea. The reading must remain in an unsettled state for the present—perhaps for ever. The reason I had for my con-

jecture, which Mr. Ellis has thought worth recording, was that I thought *simul* was wanted after *idem*. Just as Catullus says of the witty Suffenus, that he became transformed into a clown the moment he put his hand to poetry—

Idem infaceto est infacetior rure,
Simul poemata attigit;

so here I thought it likely that he would use a similar form of expression to denote a transformation of equal suddenness.

Idemque Thalle turbida rapacior procella,
Simul Laverna vernulas ostendit oscitantes.

For the second line, I would compare Martial's *dormitantem vernam*, viii. 9, 11, quoted by Mr. Munro. The confusion of the end of *Laverna* and the beginning of *vernulas* might have caused the chief corruption of the line, and the *mul* of *simul* joined with the beginning of *Laverna* might have given rise to *mulier*, and we might suppose a gloss *diva*. But it must be said of this conjecture, as of others, οὐκ ἔχει ἐλεγχον. I also thought of

Convivium simul viros ostendit oscitantes.

Mr. Ellis might have been more copious in his illustration of *idem*, which is *the regular word* for combining inconsistent attributes, doing things surprisingly different. Catullus himself has "Leno esse atque *idem* saevus et indomitus." Cf. Hor. Od. II. xix. 23, *Idem* pacis eras mediusque belli. Cic. Phil. ii. 16, *Idem* maestitiam reprehendit, *idem* iocum. Juv. vii. 198, si volet haec eadem fiet de consule rhetor.

Mr. Ellis has a learned note on *catagraphosque Thynos*, in which he gives us our choice of five meanings. With *palam habere*, in v. 8, he well compares Hor. S. i. 2, 84,

"Nec si quid honesti est Iactat *habetque palam*." With *reglutina* he compares *viscatis manibus* of Lucilius, and *pede glutineo* of Rutilius Namatianus (*vide note ad loc.*)

Of *minuta* for *inimica* of the MSS., v. 12, Mr. Ellis says, it "is due to the Italian scholars of the fifteenth century; it is perhaps the finest emendation which has been made in Catullus." It is, no doubt, a certain correction, but surely Froelich's *aes*, xli. 8, is the finest emendation made, either in Catullus or anywhere else.

XXVI.

Furi villula nostra non ad Austri
 Flatus opposita est, neque ad Favoni,
 Aut saevi Boreae aut Apheliotae,
 Verum ad milia quindecim et ducentos.
 O ventum horribilem atque pestilentem!

I. uostra O. nostra *cett.*

In this poem the poet speaks of his pecuniary embarrassments with the contemptuous lightness and indifference that was usual with him when writing on the subject. Most provokingly, here our MS. *O* has *vostra*, instead of *nostra*, and Baehrens and Mr. Munro, I am sorry to see, prefer *vestra*, which, of course, changes the whole spirit of the poem. I feel that Mr. Ellis is right in retaining *nostra*. The variant in *O* is of no account. The confounding of *vostra* and *nostra* is very common, and sometimes it is very difficult to say which is the word written. In lviii. 1, "Coeli, Lesbia nostra Lesbia, illa," both *O* and *G*, as well as seven other MSS., have *uestra*, and in lxvi. 87, the codices give *nostras* for *vestras*. In lxiv. 160, *O* gives *nostras* for *vestras*. In lxxi. 3, *G* gives (apparently) *nostrum* for *vestrum*. Therefore the variant here is of no moment. Some say that Catullus is here satirising Furius for the poverty of his family, and point to

the twenty-third poem, "Furei cui neque servos est neque arca." But there is a difference between poverty and debt: debt implies a certain amount of riches, and if the description of the poverty of the family of Furius, in the twenty-third poem, was founded on fact, it is probable they had no villa at all, and would not have been able to raise a loan of fifteen thousand two hundred sesterces. Mr. Munro says, "On the whole, my feeling is for *vestra*, as I think that Catullus, though he would readily jest with a dear friend like Fabullus on his own poverty (as in xiii. 8), would be more likely to jeer at a butt, like Furius, for his lack of means (as he does in 23), than to expose his own." But Catullus was a man of many moods, as other men are, and because he once makes a butt of Furius, it does not follow that he always did so. Indeed, if we put the natural interpretation on xi. (Furi et Aureli comites Catulli), which I believe is the right one, without resorting to any supposition of irony, we may suppose that Catullus and Furius were often very good friends.

In the famous attack on Caesar and Mamurra, xxix., I have no doubt that Mr. Ellis is wrong in reading *unchi*, instead of *ante* in the fourth verse, and right in reading *aut Adoneus*, not *haut idoneus*, with Mr. Munro, in the eighth verse. All the emendations of the twentieth line seem equally infelicitous, and I agree with those critics who regard it as an interpolation. Mr. Ellis's emendation of the twenty-third, 'urbis o pudet meae,' for the corrupt 'urbis opulentissime,' strikes me as very clever, though not convincing; and the same remark applies to Mr. Munro's 'urbis ob luem ipsimae.' I think Mueller's *urbis o potissimi* quite satisfactory. The charges against the character of Caesar in this poem and the fifty-seventh are well and powerfully answered by Mr. Munro, who has done a real service to the memories of some of Rome's greatest men by pointing out the unreality and baselessness of ancient lampoons (*Elucidations*, p. 92, *seqq.*)

XXXVI.

Annales Volusi cacata charta
 Votum solvite pro mea puella.
 Nam sanctae Veneri Cupidinique
 Vovit, si sibi restitutus essem
 5 Desissemque truces vibrare iambos,
 Electissima pessimi poetae
 Scripta tardipedi deo daturam
 Infelicibus ustulanda lignis.
 Et hoc pessima se puella vidit
 10 Iocosis lepide vovere divis.

9. hoc *V*, haec *Itali*. 10. Iocose *V*, iocosis *scripsi*.

Mr. Ellis is quite right, in my opinion, in retaining *hoc*, instead of *haec*, an easy change made by the old editors, but I do not agree with him that *hoc* refers to Volusius' annals. It is joined, I think, with *vovere*, and the point lies in the repetition of the word *pessima* with *puella*: "She vowed that she would commit the choicest writings of the worst poet in the world to the halting fire-god, to be consumed with unlucky faggots. And the naughtiest girl in the world [cf. 'pessimae puellae,' lv. 10] saw that this was a humorous vow she was making to the laughter-loving gods." That 'hoc lepide vovere' simply means 'hoc lepidum votum esse' is, I think, shown by 16, 17: 'Acceptum faces redditumque votum Si non illepidum neque invenustum est. I do not think Catullus wrote *iocose lepide*, and I think *iocosis*, applied to Cupid and Venus, φιλομμηδής Ἀφροδίτη, is borne out by Horace's 'Erycina ridens, quam iocus circum volat et Cupido.' Mr. Ellis, indeed, illustrates the asyndeton, *iocose lepide*, by *diversae variae*, in xlvi. 11; but I scarcely think that reading can stand there. I will print that poem out of its place, to show this:—

XLVI.

- Iam ver egelidos refert tepores,
 Iam caeli furor aequinoctialis
 Iucundis Zephyri silescit aureis.
 Linquantur Phrygii, Catulle, campi,
 5 Nicaeaeque ager uber aestuosae.
 Ad claras Asiae volemus urbes.
 Iam mens praetrepidans avet vagari,
 Iam laeti studio pedes vigescunt.
 O dulces comitum valete coetus,
 10 Longe quos simul a domo profectos
 Diverse maria et viae reportant.

11. Diuerse uarie uiae *V.* diverse maria *scripti*.

This exquisite little poem was written at the break-up of Memmius' staff at the termination of his year of office as governor of Bithynia. Catullus here says good-bye to the rest of the *cohors*, as he is going to take a tour through the famous ancient cities of Asia. I may cite here Mr. Ellis's admirable illustrations: "The cities of Asia Minor were at this time the most interesting in the world. We may estimate the curiosity of Catullus by Horace's words, Ep. i. 11. 103:—

Quid tibi visa Chios, Bullati, notaque Lesbos?
 Quid concinna Samos? quid Croesi regia Sardis?
 Smyrna quid et Colophon? maiora minorave fama?

And by Ovid's

Trist. i. 2, 78, Oppida non Asiae, non mihi visa prius.
 Pont. ii. 10, 21, Te duce magnificas Asiae perspeximus urbes.

Not many years before Catullus, Cato had put off his return to Rome, *βουληθεὶς πλανηθῆναι καθ' ἱστορίαν τῆς Ἀσίας* (Plut. Cato, 12)—a journey which his friend Curio

told him was likely to make him pleasanter and more civilised."

The words in which Catullus anticipates the pleasures of his trip, and release from routine and work, will be thoroughly appreciated by anyone who looks forward now-a-days to the excitement of a vacation tour on the continent. The pedestrian especially will acknowledge a fellow-feeling with the words, "Iam laeti studio pedes vigescunt." The eagerness of the poet to reach the scenes he longs for is well expressed by *volemus*, though it would be more appropriate to modern than to ancient locomotion. While Catullus was going on his tour, the rest of the staff were making their way home by different routes. And here again I object to the asyndeton in the MS. reading *diversae variae*, and I think it pretty certain that *maria* was corrupted to *varie*, owing to the proximity of *diverse*. *Mare* and *viae*, sea voyages and journeys by land, are often mentioned together, Hor. Od. II. vi. 7:—

Sit modus lasso maris et viarum,
Militiæque!

Id. Epp. I. xi. 6:—

An Lebedum laudas odio maris atque viarum?

Diverse of course is opposed to *simul*. The staff-officers started from home together; they go home severally by different routes, by sea and land.

XXXVIII.

Malest Cornifici tuo Catullo,
Malest, mehercule! et laboriose,
Et magis magis in dies et horas.
Quem tu, quod minimum facillimumque est,
5 Qua solatus es allocutione?
Irascor tibi. Sic meos amores?
Paulum quidlubet allocutionis,
Maestius lacrimis Simonideis.

This extremely pathetic poem was probably written by the young poet when labouring under the ailment which ended in his death, and took away from the world the brightest genius it had known, many years too soon. The words 'Et magis magis in dies et horas' look as if his complaint was consumption, and the *tussis* and *gravedo* mentioned in the forty-fourth poem would seem to indicate a predisposition to that disorder. The only difficulty in the poem is the line 'Irascor tibi. Sic meos amores?' which, as Mr. Ellis points out, cannot be translated as Mr. Martin renders it, 'Ah, is it so that you my love requite,' for *amores* in the plural never means affection for a friend. "Meos amores," where it is not 'my beloved,' as in xv. 1; xxi. 4; xl. 7, all spoken, I think, of Juventius, can only mean 'my passion and all that concerns it, my tale of passion,' as in vi. 16, 'Volo te ac tuos amores Ad caelum lepido vocare versu.' . . . 'Catullus, it would seem, had taken Cornificius into his confidence about his passion, probably for Lesbia, as that which had given him most suffering' (*Commentary*, p. 106). I think it possible that a somewhat different explanation may be given. We may suppose Cornificius had acted in some way which Catullus did not approve, towards some one to whom the poet was attached; and then the line would mean 'I have a crow to pluck with you: could you act so to my pet? Come and let us have it out.' It is also possible that *amores* is corrupt, and that the true reading is *sic meos amare!* 'Is it thus that my friends love me!' If *amare* was the true reading, it would almost certainly be altered to *amores* by the copyist, owing to the common occurrence of the phrase *meos amores*. Again, Mr. Ellis rightly points out that *maestius* in the last line is wrongly translated by Martin and Cranstoun, 'though sadder.' It means simply 'sadder': 'Let me have one word of address, no matter how little, and let it be sadder than the dirges of Simonides.'

Mr. Ellis reads, as many others have done before him, *Ameana* in xli. 1, the MSS. giving *A me an a*, and thinks that Ameana or Ammiana may have been the name of the mistress of the Formian bankrupt, whom certain people dared to compare to Lesbia. I do not agree to this. Catullus, as I think, carefully avoided mentioning this woman's name, and preferred to describe her by her peculiarities of feature, gait and habit, in this and the two next poems. Besides, I think the close proximity of *puella* makes it very unlikely that the name is given. If Catullus wrote *Ameana* he would have left out *puella*. If he wrote *puella* he would have left out the proper name. I do not think the corruption is yet corrected, and I have myself nothing to offer.

Everyone is by this time familiar with the reading adopted by Mr. Ellis in the last line of this poem :

Non est sana puella, nec rogare
Qualis sit solet *aes* imaginisum.

'The girl is mad, and never consults her looking-glass. For *aes* the MSS. have *et*, and all sorts of emendations of the passage were made, but it was reserved for a modern scholar, Froelich, to hit the truth, and Mr. Ellis has most properly introduced this beautiful emendation into his text. It is on the whole the neatest emendation ever made. How Scaliger would have triumphed if he had thought of *aes* instead of his own miserable *haec*, with *rogate* for *rogare*. Mr. Ellis has been at pains to sustain *aes* from Pliny, Aeschylus, and the Anthology. Aeschylus, fr. 384, has

κάτοπτρον εἶδους χαλκός ἐστ' οἶνος δὲ νοῦ.

It being established by these passages that '*aes imaginisum*' may well mean a mirror, the sense of the line may be well illustrated by such passages as Ovid, Am. A. A. 3, 136 :—'*Nec genus ornatus unum est : quod quamque decebit Eligat, et speculum consulat ante suum,*' and *id.*

Am. II. xvii. 9:—‘Scilicet a speculi sumuntur imagine fastus.’ The only difficulty, if it be a difficulty, is that *imagnosus* does not seem to occur elsewhere. It is, however, a correctly formed word, and is not the only ἀπαξ λεγόμενον in Catullus. It is, moreover, most properly applied to a mirror, cf. Gell. xvi. 18, 3: ‘ut *speculum* in loco certo positum nihil *imagnet*’—a passage deserving of being quoted by Mr. Ellis.

XLIV.

- O funde noster seu Sabine seu Tiburs,
 (Nam te esse Tiburtem autumant, quibus non est
 Cordi Catullum laedere: at quibus cordi est,
 Quovis Sabinum pignore esse contendunt)
 5 Sed seu Sabine sive verius Tiburs,
 Fui libenter in tua suburbana
 Villa, malamque pectore expuli tussim,
 Non immerenti quam mihi meus venter,
 Dum sumptuosas appeto, dedit, cenas.
 10 Nam, Sestianus dum volo esse conviva,
 Orationem in Antium petitozem
 Plenam veneni et pestilentiae legi.
 Hic me gravedo frigida et frequens tussis
 Quassavit usque dum in tuum sinum fugi,
 15 Et me recuravi otioque et urtica.
 Quare refectus maximas tibi grates
 Ago, meum quod non es ulta peccatum.
 Nec deprecor iam, si nefaria scripta
 Sesti recepso, quin gravedinem et tussim
 20 Non mihi, sed ipsi Sestio ferat frigus,
 Qui tum vocat me cum malum librum legi.

7. Expulsus sim *V.* expuli *Avantius*, expui *Scaliger*, *Ellis*. 12. legi *V.*, *Lachmannus*, *Ellis*. legit *vulgo ante Lachmannum*. 21. legit *codices*, legi *Lachmannus*, *Ellis*. fecit *Baehrens*.

I think *expuli* is more likely than *expui* in 7, and it is at least equally near the Mss. *Expellere morbum* is the

regular expression: Mr. Ellis himself quotes Hor. Ep. II. ii. 137, and we might add Tibull. IV. iv. 1, *Huc ades et tenerae morbos expelle puellae*. On the other hand, 'exspuere sanguinem,' quoted by Mr. Ellis from Celsus, is not to the point: we say, 'to spit blood,' but not 'to spit away a cough.'

I think Mr. Ellis's reading of the two chief points of dispute in this poem is right—*legi*, in both 12 and 21. As he well points out, *recepso*, in 20, refers to his taking Sestius' speech into his own hands, and we may imagine Sestius saying to Catullus, 'Here is a speech I have just written; take it home with you, and read it, and then come and dine with me, and tell me what you think of it.' Catullus says he was rash enough to do this once, induced by the expectation of enjoying a sumptuous dinner at Sestius' house; but he paid for it, for the style of the speech was so frigid that it gave him a violent cold, which took him time and pains to cure. With the joke on the frigidity of Sestius' style, we may compare the gibe of Aristophanes at Theognis, Acharnians, 138:—

εἰ μὴ κατένιψε χιόνι τὴν Θράκην ὄλην
καὶ τοὺς ποταμοὺς ἔπηξ' ὑπ' αὐτὸν τὸν χρόνον
ὄτ' ἐνθαδὶ Θέογνις ἠγωνίζετο.

Baehrens' conjecture, *fecit*, in v. 21, although clever, is not in harmony with the explanation which Mr. Ellis prefers, and which I think is the true one.

XLV.

Acmen Septimius suos amores
Tenens in gremio 'mea' inquit 'Acme,
Ni te perdit amo atque amare porro
Omnes sum assidue paratus annos
5 Quantum qui pote plurimum perire,
Solut in Libya Indiave tosta

- Caesio veniam obuius leoni.
 Hoc ut dixit, Amor, sinistra UT ANTE,
 Dextram sternuit approbationem.
- 10 At Acme leviter caput reflectens
 Et dulcis pueri ebrios ocellos
 Illo purpureo ore saviata,
 'Sic' inquit 'mea vita Septimille,
 Huic uni domino usque serviamus,
- 15 Vt multo mihi maior acriorque
 Ignis mollibus ardet in medullis.'
 Hoc ut dixit, Amor, sinistra ut ante,
 Dextram sternuit adprobationem.
 Nunc ab auspicio bono profecti
- 20 Mutuis animis amant amantur.
 Vnam Septimius misellus Acmen
 Mavult quam Syrias Britanniasque:
 Vno in Septimio fidelis Acme
 Facit delicias libidinisque.
- 25 Quis ullos homines beatiores
 Vidit, quis Venerem auspiciorem?

There is only one slight flaw in this polished gem. It consists in the words *ut ante*, in v. 8. I have no doubt whatever that *ut ante* has been foisted in here from 17. The credit of seeing this belongs, however, to Scaliger, not to Baehrens, as Mr. Munro seems to think. Scaliger says, "Locus corruptus ex eodem versu, qui infra legitur. Nam iam primum sternuit approbationem." Perhaps Mr. Munro's *manu sinistra* or *sinister astans* may be right. I prefer the former—'Love on their left sneezed propitious approval.' I would not translate *dextram* 'towards the right,' with Mr. Munro. I think there is a play, and a happy one, on the literal sense of *sinistra* and the derived sense of *dextram*.

The close intimacy between Catullus and Calvus, a man of brilliant parts, is depicted in the fiftieth poem.

- Hesterno Licini die otiosi
 Multum lusimus in meis tabellis,
 Ut convenerat esse delicatos.
 Scribens versiculos uterque nostrum
 5 Ludebat numero modo hoc, modo illoc,
 Reddens mutua per iocum atque vinum.
 Atque illinc abii tuo lepore
 Incensus Licini facetiisque
 Ut nec me miserum cibus iuaret,
 10 Nec somnus tegeret quiete ocellos *cet.*

Mr. Ellis rightly rejects the old idea, that *esse*, in the third line, is from *edo*, for the ninth line shows that Catullus dined gloomily afterwards alone. He rightly connects *esse* with *otiosi*: 'the two poets,' he says, 'had agreed to play the idler for the day.' But it is more natural to translate *convenerat* 'it became': 'Idling, as men of taste should.' I would suggest the transposition of 2 and 3, to bring *otiosi* nearer to *esse*.

Catullus is one of the few translators whose translations surpass their originals. His version of Sappho's ode is stamped with his own genius. There is a downrightness of statement and earnestness of feeling in

Ille mi par esse deo videtur,

that is not so conspicuous in φαίνεται μοι κῆνος ἴσος θεοῖσιν. One would never have suspected the Latin to be a translation. And the finest of Sappho's stanzas—

ἀλλὰ καμὲν γλώσσα ἔαγε, λήπτων δ'
 αὐτίκα χρῶ πῦρ ὑποδεδρόμακεν
 ὀππάτεσσι δ' οὐδὲν ὄρημ' ἐπιρρόμ-
 βεισι δ' ἄκουαι

loses nothing in the Latin—

Lingua sed torpet, tenuis sub artus
 Flamma demanat, sonitu suopte
 Tintinant aures, gemina teguntur
 Lumina nocte,

although *tintinant* is a poor equivalent for ἐπιρρόμβησι.

Mr. Ellis retains the Ms. reading *gemina*, changed to *geminæ*, agreeing with *ares*, by Schrader. Mr. Munro, writing on lxiii. 75 (*geminas* deorum ad *ares*), calls *gemina nocte* here an absurd reading. I had accustomed myself to think it a beautiful reading, but Mr. Munro's remark has rather staggered me, and I admit that it is possible that *geminæ* may have been changed to *gemina* by the copyist, thinking it ought to agree with *lumina*; and the expression *geminæ ares* no doubt occurs more than once in Latin. But *geminus* is not only applied to the ears, but to the hands, the eyes, the temples, the feet, in Latin. And the fact that there is a stop in *O* after *ares* is not to be overlooked, and Mr. Ellis has not overlooked it. And the rhythm of the verse from the Latin point of view is better with the pause produced by the stop at *ares* than at *geminæ*. Indeed there is no instance in the Sapphics of Catullus of the pause so late in the verse. I believe therefore that Catullus, not being able to say 'geminā teguntur lumina nocte,' may have varied the expression, and said 'geminā teguntur lumina nocte,' thereby adding greatly, in my opinion, to the beauty of the verse.

The 61st poem, the Epithalamium of Manlius and Junia, or Vinia, is certainly the most beautiful marriage hymn ever written. It produces much the same effect on the mind as an English wedding. There is the same mixture of solemnity and gaiety, of admiration for the beautiful and youthful bride with thoughtful ponderings over the new duties and pleasures that are to come upon her, tinged here and there with just a shade of melancholy at the thought of the rapid transit of life—from childhood to girlhood, from girlhood to old age. Surely nothing can equal the stately grace of the verses in which the weeping bride is consoled—

Flere desine. Non tibi Au-
Runculeia periculum est
Ne qua femina pulchrior
Clarum ab oceano diem
Viderit venientem.

Mr. Ellis's commentary on the poem leaves nothing to be desired. In lxii. 35, I wonder he has not accepted *eous* for *eosdem*. The passage he quotes from Cicero in defence of *eosdem* is not to the point.

For the benefit of *tirones*, I will here give an easy account of the Galliambic metre, as *Catullus wrote it* in the Attis. Its normal form is a third Paeon, second Epitrite, third Paeon, and Proceleusmaticus:—

Super alta | vectus Attis || celeri ra|te maria.

The union of the third Paeon with the second Epitrite was pretty common in Greek choral poetry. The chorus in Aeschylus Prom. 397 is chiefly written in this metre:—

ἰδίοις νό|μοις κρατύνων | ὑπερήφα | νον θεοῖς τοῖς | πάρος
ἐνδείκ|νυσιν αἰχμάν.

It will be observed that here the original Ionic a minore, of which Galliambic metre was a variation, comes back in one instance: we shall see whether it comes back in Catullus presently.

Again, Euripides, Bacchae 530, *seqq.*, joins the third Paeon, second Epitrite, and Ionic a minore together:—

σὺ δὲ μ' ὦ μά|καιρα Δίρκα | στεφανυφό|ρους ἀπωθεῖ
θιάσους ἔ|χουσιν ἐν σοί | τί μ' ἀναίνεις; | τί με φεύγεις |.

But Catullus *only modifies his normal form by resolution or contraction*, and does not admit Ionic a minore. Fifteen times in this poem, I think, he resolves a long syllable into two short ones; and sixteen times he contracts two short syllables into one long one.

Resolution :—

Stimulatus | *īdī* furenti || rabie va|gus animis.

Here the first long syllable in the Epitrite is resolved into two short syllables, *īdī*.

Contraction :—

Sectam me|am executae || duce me mi|hi comites.

Here the first two short syllables of the Paeon are contracted into one long one *sēc*.

Both these processes of contraction and resolution apply in Greek, *e.g.*, Euripides, *Bacchae*, 79, 80, has resolution and contraction in two consecutive lines (in Ionic a minore):—

τὰ τε ματρὸς | μεγάλας ὄρ|για Κυβέλας | θεμιτεύων
ἀνὰ θύρσον | τε τινάσσων | κισσῶ τε | στεφανώθεις.

In the former line the first two syllables of Κυβέλας are equivalent to one long syllable; and in the latter the first syllable of κισσῶ is equivalent to two short. Now, these processes of contraction and resolution account for all the deviations from the normal form of the verse in the Attis.

There are, however, three lines, which, as read in the old text, present Ionici a minore. But I think they are all false readings. The first is verse 18 :—

Hilarate aere citatis erroribus animum.

According to this reading, the verse begins with two Ionici a minore. But the best MSS. give *hilarate erocitatis*, or *crocitatis*. This, I am pretty sure, points to *concitatis* (*cōcī-tatis*), reading which, the normal form of the verse reappears, with contraction in the first syllable of *erroribus*. The next instance is 53 :—

Ut earum omnia adirem furibunda latibula.

Here, again, two Ionici a minore begin the verse. But independently of metrical considerations, *omnia* is so weak that we should not hesitate to restore *opaca* and the normal form. (*Operta*, L. Mueller, who also suggested *opaca*, at which I arrived independently; *alumna*, Baehrens). *Furibunda* is much better as nom. sing. applied to Attis, than acc. plur. applied to the wild beasts' dens., cf. *tremebunda* fem. in v. 11. *Miser*, in 51, may be changed, if necessary, to *misera*; but I am not sure that it is necessary.

The third instance is 60:—

Abero foro palaestra stadio et gymnasiis.

This line is doubly defective, on account of the Ionic a minore in the third foot, and because the verse is a syllable short. Here we should undoubtedly accept Mr. Ellis's own excellent suggestion, *guminasiis*, adopted by Mueller and Baehrens, though not by himself. There is plenty of evidence for the form *guminasium*.

I have only a few disjointed jottings to offer on Catullus' longest poem, his epyllion on the nuptials of Peleus and Thetis. Mr. Ellis displays his usual tenderness in dealing with the text, and, I must say, contrasts favourably with Baehrens in this respect, whose infelicitous emendations disfigure a work which, on other grounds, possesses high merits. Baehrens is a scholar of a high order, and, as Mr. Ellis expresses it, eminently 'sagax crisi codicum;' but in the province of emendation he is not, as a rule, more successful than his countryman Lucian Mueller, although he is not inferior to that critic in conjectural daring.

lxiv. 11, *Illa rudem cursu prima imbuit Amphitriten*. So Mr. Ellis, rightly discarding *praera* and *proram* of O, which came in owing to the vicinity of *carinae*. 13. *Tortaque* for *tota*, a very old, obvious, and certain correction adopted by Mr. Ellis: *mota*, Baehrens. Slight as the difference is,

there is all the difference between a good and bad emendation. *Torta* and *tota* are often confounded in MSS.; not so *mota* and *tota*.

- 14 *Emersere feri candenti e gurgite vultus*
Aequoreae monstrum Nereides admirantes.

Mr. Ellis adheres to the MS. reading *feri*, and translates *feri vultus* 'wild faces,' making it the nominative to *emersere*, and in apposition with *Nereides*. He records Schrader's emendation, *freti*, which I think, with Mr. Munro, is right. *Emersere* then will be transitive, and I believe this was the primary use of the verb. There are many examples to be found of the transitive use. *Vultus* will be the accusative. I wonder did Mr. Tennyson get his 'fierce mermaiden' from 'feri vultus.'

- 16 *Illa atque haud alia viderunt luce marinas*
Mortales oculi nudato corpore Nymphas
Nutricum tenus extantes e gurgite cano.

The MSS., except *O*, give *Illa atque alia*, *O, illa alia*. Mr. Ellis adopts Bergk's conjecture, which gives a good sense, though not very near to the MSS. I do not like Mr. Munro's *Illa* (quaque alia?) at all. I would suggest

Illac aequalis viderunt luce marinas.

Cf. Verg. Georg. iv. 460, 'chorus aequalis Dryadum.' The author of the *Ciris*, who imitated Catullus so closely, has, 435, 'florentes aequali corpore Nymphae.' This reads like a reminiscence of the line I am discussing, and of the next, which ends with 'nudato corpore Nymphas.'

For *sensit*, in 21, I would suggest *suasit*. We then come to an important passage—

- 22 *O nimis optato saeculorum tempore nati*
Heroes, salvete deum genus! o bona mater!
Vos ego saepe meo vos carmine compellabo.

So we find the passage in Mr. Ellis' text, and so it appears in the MSS., except that *G* has ^{mater} *matre* (*sic*). "*Mater*," says Mr. Ellis, in his commentary, "is usually interpreted of Thetis. It seems better to explain it with Muretus of the Argo. In Apoll. R. iv. 1325, the Argonauts are directed to pay to their mother a return for all her long labour in bearing them in her womb, and this is explained in 1370 to refer to the Argo itself, which had carried them through a continued series of toils. This passage Catullus seems to have known." The line referred to is quoted in the first volume, *Μήτερα δ' οὐκ ἄλλην προτιόσσομαι ἢ πὲρ αὐτῆν Νῆα πέλειν*. Now, this is an ingenious interpretation, and would be satisfactory only for the fragment of the Veronese scholiast on Virgil Aen. v. 80. 'Catullus salvetē deum gens, o bona matrum Progenies salvetē iter—,' and then a blank. Hence Mr. Munro writes the passage thus—

O nimis optato saeculorum tempore nati
 Heroes salvetē, deum gens, o bona matrum
 Progenies, salvetē *iterumque iterumque, bonarum*:
 Vos ego saepe meo vos carmine compellabo.

I believe that Mr. Munro has here rendered a great service to Catullus. For he has, in my opinion, reproduced nearly the exact words that were lost. For I believe that a verse was lost, and that the Veronese scholia preserve part of it. Many critics have entertained the same supposition since the publication of these scholia, but no one has filled up the gap half so well as Mr. Munro. There are two reasons, neither of which Mr. Munro has mentioned himself, which influence me very strongly in favour of his reading. First, it supplies a reason why the line was omitted, namely, the similar termination of *matrum* and *bonarum*. Secondly, *bona matrum Progenies* imperatively demands *bonarum* as an epithet of *matrum*;

for *bona* is not a peculiarly proper epithet of *progenies*, but *bona* is a peculiarly proper epithet of *mater*. We have *bona matre*, lxi. 220, *optima matre*, *ibid.* 222. It is the appropriateness of the epithet to *matrum* that excuses the application of it to *progenies*. Hence I cordially welcome Mr. Munro's restoration and his translation, 'right worthy progeny of right worthy mothers.' I should suggest, however, *salvete iterum salvete*, instead of *salvete iterumque iterumque*.

Mr. Ellis's careful and candid commentary on the passage, with his account of the scholia, and the criticisms that have been made thereon, fully makes up for any harm his disparagement of the scholia themselves might have occasioned; and I cannot but wonder that Mr. Munro has not a word to say in praise of the former, while he has so much and such vigorous invective to pour forth on the latter.

In 23 I would suggest *mero* for *meo*. 31. *Optatae finito tempore lucis* is simpler and better than *optato finitae*. In 64 *velatum* should give place to Schwabe's *nudatum*.

116 Sed quid ego a primo digressus carmine plura
 Commemorem, ut linquens genitoris filia vultum,
 Ut consanguineae complexum, ut denique matris,
 Quae misera in gremio gnatam deperdita aiebat,
 120 Omnibus his Thesei dulcem praeoptarit amorem,
 Atthide vecta rati spumosa ad litora Diae?
 Aut ut eam Diae devinctam lumina somno
 Liquerit immemori discedens pectore coniunx?

119. ingnata deperdita leta *V.* in gnata deperdita lamentata est *Conington*, *Ellis*. laetabatur *Lachmann*. in gremio gnatam deperdita aiebat *scripsi*. 120. portaret *libri*, praeoptarit *Statius*. 121. Aut ut *G*, *vulgo*. ut *om.* *O.* Atthide *scripsi*. necta *pro* vecta *O.* ratis *V*, rati *Passerat*, *Lachmann*. 122. Diae *addidi*. *om.* *V.* Venerit, aut *Lachmann*. *Epitheton ad somno supplent*, *tristi Scaliger*, *molli Baehrens*, *dulci ed. pr.* *Spatium relinquit Ellis*, *coniciens devincta tenentem lumina somno*.

The corrupt *letu* at the end of 119 seems to me to repre-

sent *alebat*, the first *a* of which dropped out after *deperdita*: cf. *supra*, 88.

Lectulus in molli complexu matris alebat.

Deperdita is 'passionately fond.' *Gremio*, I think, may have dropped out through parablepsy of the scribe to the *g* in *gnatam*. *Gremio* is the proper word here, cf. lxi. 58. Tu fero iuveni in manus Floridam ipse puellulam Dedis a gremio suae Matris. *Ibid.* 217. Matris e gremio suae. I never liked Conington's emendation. In 121, which Mr. Ellis reads as in the MSS.,

Aut ut vecta ratis spumosa ad litora Diae,

taking *vecta* for *vecta fuerit*, I have made two changes. *Vectus* is more properly said of the passenger than of the vessel, and *vehi rate* is one of the commonest of common-places. Therefore I have accepted Lachmann's *rati*. I have also changed *Aut ut* at the beginning of the verse to *Atthide*, 'Athenian.' For I think that *Aut ut*, at the beginning of the next verse, sharply defines the period when Theseus' infidelity began. Up to the time they arrived at Dia, all went well with Ariadne's love. But at Dia she was deserted. Hence the disjunctive *aut*. Moreover, I think *rati* is weak without a distinctive epithet, as in Prop. III. xix. 26, Pendet Cretaea tracta puella rate. Lachmann's *Venerit, aut ut eam* in the next line is weak, and metrically faulty to my ear.

For the gap in the 122nd line I supply *Diae*, which may have fallen out before *devinctam*. Some word is wanted to describe the place where Theseus deserted Ariadne, and none is so appropriate as the repetition of *Diae*.

In the 184th line we find the MSS. unanimous in favour of a reading which is very unlike Catullus. Ariadne, looking round on the deserted island, says:—

Praeterea nullo litus, sola insula, tecto.

There are two objections to this reading—first, the awkward interposition of *sola insula* between *nullo litus* and *tecto*; secondly, if there were any houses in Dia, they would not be on the shore. Read:—

Praeterea nullo colitur sola insula tecto.

Ariadne being on the shore, the copyist had *litus* in his mind, and thought the two last syllables of *colitur* were *litus*. The first *co* would drop out after *nullo*. We find in Cic. Rosc. Com. xii. ager *incultus sine tecto*. Ovid, who, in his account of the desertion of Ariadne, drew largely on Catullus, has, Her. x. 59:—

Quid faciam? quo sola ferar? vacat insula cultu.
Non hominum video, non ego facta boum.

And *Ibid.* 97:—

Sive colunt habitantque viri, diffidimus illis.

226 Nostros ut luctus nostraeque incendia mentis
Carbasus obscurata dicet ferrugine Hibera.

Mr. Ellis rightly retains *dicet*; and here a word of praise may be given to the archetype which keeps it, when the change to *obscura dicat* was so easy. Mr. Ellis's note is: "*dicet*: may show. Nonius, 287, Dicare indicare nuntiare. Lucilius, lib. xxx., Sicubi ad auris Fama tuam pugnam clarans allata dicasset. So Lucretius uses *dedicare* = *indicare*." He rather spoils the effect of this excellent note by adding, "there is some plausibility in Lachmann's conjecture, *decet*."

Mr. Ellis has added an attractive feature to his second edition in a beautifully executed fac-simile of a page of the now famous codex *O*, containing thirty-one verses of the sixty-fourth poem, 336—366. He also gives a page of the Codex Thuanaeus, containing twenty-two verses of the sixty-second poem. This is an example worthy of being

followed. Now that the great Latinists of our country have taught students to ascend nearer and nearer to the fountain-heads of Roman literature, such fac-similes as these will be more and more appreciated by those who cannot hope to see the MSS. themselves. It is to be hoped that a sample of the Leyden MSS. of Lucretius will adorn a future edition of Mr. Munro's noble work. It is in this page that the line

Cum Phrygii Teucro manabunt sanguine teuen

occurs. How the mysterious *teuen* made its way into the MSS. is a puzzle, for the vulgate *campi*, Mr. Ellis's reading, seems pretty certainly right, and is well supported by him. In 351 Mr. Ellis's *incurvo* is better, I think, than any conjecture yet made.

The poem which appears in Mr. Ellis's edition as the 68th is perplexing. The two main questions it gives rise to are: (1) Is it all one poem, or is it to be divided into two poems at v. 41? (2) Is the Mallius or Manlius of the first part of the poem the same as the Allius of the second part?

Nearly all editors, Mr. Ellis included, regard this poem as two-fold. But there is a distinction. Mr. Ellis regards it as falling into two separate parts, addressed to the same person. Baehrens and Mr. Munro, and most other modern critics, regard the two poems as quite distinct, and as addressed to two separate persons.

That Mr. Ellis is in the main right, and Mr. Munro and Baehrens and the other editors wrong, I feel perfectly convinced. Without going into the controversy at length, which would oblige me to print the whole of this long poem, I will merely state my views on the subject.

Vinia Aurunculeia, the wife of Manlius Torquatus, was dead. The young bride of the sixty-first poem, who had no reason to fear lest the bright sun rising from his ocean

bed should descry a rival to her beauty, had not lingered on earth until *cana anilitas* had caused her head to nod assent to all. She was dead in her young beauty, and had left her bridegroom shipwrecked with grief, at the threshold of death. He wrote to Catullus, then at Verona, to ask him for consolation, in the shape of a love poem, which might distract his thoughts from the grief that made him sleepless. As no direct mention is made of *Aurunculeia* in Catullus' answer, even in the part of it which is admittedly written to Manlius, I consider it likely that Manlius' request was expressly for something that might lead his thoughts away from his buried happiness.

But the request reached Catullus at an inauspicious time. His beloved brother's death near Troy had given him a severe shock. Who shall pretend to pierce the motives which impelled him to retire to his paternal home at Verona? But we may well conjecture that a desire to supply his brother's loss in the old loved homestead, combined with the sorrow which that loss caused him, created a great change in his mind and habits. That such a change was caused, and lasted long, we know. Accordingly he writes to Manlius, to decline to comply with his request, owing to his indisposition to write love poems at such a time.

But although he felt quite unable to write the sort of poem Manlius had asked for, the *lusus veneris*, from which his soul rebelled at that time, he determined to compromise the matter by writing a poem of a higher tone and nobler scope, in which he might both gratify Manlius by singing his praises, and at the same time interweave with the theme his own grief for his brother's death. Accordingly he wrote and sent the poem beginning at *lxviii. 41*—a poem which he describes as, though not perhaps the love poem Manlius asked for, yet the best he could write under the circumstances (*149, Hoc tibi, quod potui*).

And here Mr. Ellis has come in for some sharp criticism from Mr. Munro. Mr. Ellis says: 'I assume here what it seems outrageous to deny, that the Mallius of the first part is the Allius and Mallius of the second.' On this Mr. Munro remarks: 'I doubt whether he is not the one scholar in the world who would attempt to deny that it is—well, bold to assert that any one in Catullus's days could have borne two gentile names.' But Mr. Ellis never asserted this, and I do not think he ever entertained such an idea: at all events, I am quite certain that it is quite possible to hold that the Manlius of the first part is the same as the Allius of the second, without any such absurd hypothesis.

In the second part of the poem the name Manlius is, I believe, intentionally disguised under the name Allius. This was done because this second part, separable as it is from the first, was intended to be shown to the world, and Manlius might not wish the part that he had taken in bringing Lesbia and Catullus together to be published without some disguise. Tacitus tells us that it was fatal to the Petras, 'quod domum suam Mnesteris et Poppaeae congressibus praebuissent,' and Manlius might have a thousand reasons for not wishing it to be publicly known that he had given the amours of Catullus and Lesbia the shelter of his roof. And therefore Catullus, just as he disguised Tanusius under the name Volusius, here disguises Manlius under the name Allius. In each case he takes another common name for the disguise, and in each case he chooses a name coming very near the name he wished to screen, except from the initiated.

There is one objection to taking Allius and Manlius for the same person, which would be fatal if it could not be set aside, lxviii. 155—

Sitis felices, et tu simul et tua vita,
Et domus ipsa in qua lusimus et domina.

If *tua vita* here means 'your wife,' I give up my theory, and hold that Mr. Ellis's, of which mine is a modification, is unsustainable, for then Manlius would be *caelebs* in the first part, and *maritus* in the second part; and the interval which we should have to allow for him to recover his grief for the loss of his first, and take a second wife, would be so long, that it would be better to discard the theory altogether, and admit the diversity of Manlius and Allius. But I know of no instance where *vita* is used absolutely for another man's wife or darling. It is, as Mr. Ellis says, commonly used in the vocative: 'my life,' 'my darling'; and though Catullus has the dative in civ. 1, the fact that he is there speaking of his own loved one, whom he valued as his life, justifies the expression, as well as the development of *vita* in the second line. But in the passage in the sixty-eighth poem he is supposed to be speaking to another man of that other man's wife, and there is no explanatory development of *vita* whatever. I do not believe that *vita* here has any reference to a woman, but simply means 'your life.' 'May you be blest, both you and your life' (on the one hand), and 'your house,' on the other. *Simul* does not couple *tu* to *tua vita*: it couples *et tu et tua vita* to *domus*, and there are only two co-ordinate nominatives to *sitis*, not three. *Domina*, in the next verse, should, I think, be *dominae*—'the house in which we and our ladies (your Aurunculeia, my Lesbia) had such pleasant times.'

I regard *et tua vita* simply as expanding *tu*. In a line quoted by Mr. Ellis from Callimachus, on lxvi. 40, σὴν ῥὲ κάρην ὥμοσα σὸν τε βίον, the latter clause is not much more than an expansion of the first, and Catullus, in translating it 'Adiuro teque tuumque caput,' seems to take σὸν βίον as equivalent to *te*.

But if the contrary theory be adopted, if we hold with Baehrens and Mr. Munro, that Manlius and Allius were

totally distinct persons, then difficulties would meet us which are scarcely to be overcome. We should then find Catullus refusing the request of his dear friend Manlius to write a poem for him, and alleging as a reason his grief for his brother's death; and at the same time, while still plunged in that same sorrow, writing a long and artificial poem for one Allius, a person totally unknown, except from this poem; and we should find Catullus borrowing from one of these poems the following lines, and using them in the other:—

O (ei) misero frater adempte mihi
Tecum una tota est nostra sepulta domus,
Omnia tecum una perierunt gaudia nostra
Quae tuus in vita dulcis alebat amor.

These occur 20, 22–24, and again 92, 94–96. Now Catullus does not plagiarise from himself; his flow of poetry was too spontaneous to require it. But if these lines occur in two separate poems, he did plagiarise from himself. But it is evident to me that it is not so; the lines form a recurring burden of woe in the same poem, the recurring burden being a feature peculiarly Catullian.

By far the greatest poem in Catullus is the seventy-sixth. It lies rather out of the beaten track, and is unknown to many readers who are familiar with the poems on the Sparrow, on Acme and Septimius, with the translation of Sappho's Ode. But the poem of which I am now speaking is infinitely superior to any of these lighter efforts of the poet's Muse. I remember well how I was positively startled by its beauty the first time I read it. Since that time I have read it, or rather repeated it (for it is such rare poetry that it at once seizes on the memory) a hundred times, and each time with wonder at the power of Catullus expressing in words the real feelings of his heart. Writing to him was what a groan is to other

men. He relieved his agony by writing. He said what he felt, neither less nor more, and in this, his honest plain-speaking, consists his superiority to all other subjective poets. He called upon his Muse to express his thoughts; if in beautiful and polished couplets, good; but if the thought could not be expressed except in rough words, the words must be rough. The thought must not be falsified in the slightest degree, for the sake of rounding a period, or introducing a simile, or avoiding an elision. Of this essential characteristic of his poetry the seventy-sixth poem is the best instance.

LXXVI.

- Si qua recordanti benefacta priora voluptas
 Est homini, cum se cogitat esse pium,
 Nec sanctam violasse fidem, nec foedere in ullo
 Divum ad fallendos numine abusum homines,
 5 Multa parata manent in longa aetate, Catulle,
 Ex hoc ingrato gaudia amore tibi.
 Nam quaecumque homines bene cuiquam aut dicere
 possunt
 Aut facere, haec a te dictaque factaque sunt;
 Omniaque ingratae perierunt credita menti.
 10 Quare cur te iam amplius excrucies?
 Quin tu animo offirmas, atque istinc te ipse reducis,
 Et dis invitis desinis esse miser?
 Difficile est longum subito deponere amorem;
 Difficile est: verum hoc qua lubet efficias.
 15 Una salus haec est: hoc est tibi pervincendum,
 Hoc facies, sive id non pote sive pote.
 O dii, si vestrum est misereri, aut si quibus umquam
 Extremo iam ipsa in morte tulistis opem,
 Me miserum aspice, et si vitam puriter egi,
 20 Eripite hanc pestem perniciemque mihi,

Quae mihi subrepens imos ut torpor in artus
 Expulit ex omni pectore laetitias.
 Non iam illud quaero contra ut me diligat illa,
 Aut, quod non potis est, esse pudica velit:
 25 Ipse valere opto, et tetrum hunc deponere morbum.
 O dii, reddite mi hoc pro pietate mea.

10. *ita*, *V.* iam te cur, *Itali*, *Ellis*. 11. *ita* *Ellis*. atque instinctoque, *G.* atque instincteque, *O.* 16. *facias*, *V.* *facies*, *alii codices*. 18. extremo, *V.* extrema, *alii codices*. extremam, *alii*, *Ellis*. ipsam, *V.* ipsa in, *editores*, *Ellis*. 21. Seu, *V.* sei, *Ellis*. heu *Conr. de Allio*, *Munro*. quae *Calpurnius*, *vulgo*.

I do not see the necessity of transposing *cur* and *iam* in the tenth verse. Catullus—as L. Mueller, quoted by Mr. Ellis on lxvi. 48, remarks—seems to have permitted the non-elision of *m* in the middle of the pentameter, lxvi. 48, Iuppiter ut chalybum omne genus pereat; lxvii. 44, Speret nec linguam esse nec auriculam; xcvi. 2, Utrum os an culum olfacerem Aemilio. It would be monstrous to proceed to amend all these passages, so as to avoid the hiatus. Besides, Catullus does not love trajections of particles, which, like *cur*, ought to begin a sentence. I should rather insert *tu* before *te* than acquiesce in the transposition. 11. I cordially accept Mr. Ellis's excellent emendation, 'istinc te ipse reducis.' *Ipse* is wanted here, and is strongly supported by the passage adduced by Mr. Ellis from Ovid Trist. v. 7, 'Sic animum tempusque traho meque ipse reduco A contemplatu dimoveoque mali.' 16. Although *facias* has better authority than *facies*, I believe in the latter, as it suits the strong, determined emphasis of the poetry better than the mild imperative—'This you SHALL do, be it possible or impossible.' By the way, *dis invitis*, in 12, is wrongly paraphrased by Mr. Martin, 'the gods smile on thy path,' as if the meaning were, 'the gods are unwilling that you should be miserable.' The meaning clearly is, 'cease to be miserable, in spite of the gods,' as Mr. Ellis rightly explains

it. 19. Why alter *extremo* (adv.), 'at the last moment?'
 21. *Invilis libris* I read *quae*, the vulgate. The corruption into *seu* must have been accidental, I think.

LXXVII.

Rupe mihi frustra ac nequiquam credite amice,
 (Frustra? immo magno cum pretio atque malo)
 Siccine subrepsti mi, atque intestina perurens,
 Hei misero eripuisti omnia nostra bona?
 5 Eripuisti, heu heu nostrae crudele venenum
 Vitae, heu *non verae* pectus amicitiae.

1. amice, *O vulgo*. amico, *ceteri codices, Lachmann, Ellis*. 6. heu nostrae,
O. he heu nostrae, *G*. heu non verae (*vel vere*), *scripsi*. pectus, *codices*, pestis,
vulgo ante Ellisium.

Mr. Munro considers it so certain that *pestis* is the true reading in 6, that he more than once cites this passage as showing the confusion between *c* and *s*. But I am certain that Mr. Ellis is right in retaining *pectus*. Indeed, I can scarcely conceive anyone proceeding to reject *pectus* who had seen the passages cited by Mr. Ellis. Mart. ix. 14:—

Hunc quem cena tibi, quem mensa paravit amicum,
 Esse putas fidae pectus amicitiae?

Statius Silv. iv. 102:—

Nec enim retinentius almae
 Pectus amicitiae.

Manilius, Ast. ii. 582:—

Idcirco nihil ex semet natura creavit
 Pectore amicitiae maius nec rarius umquam.

Surely these passages show that *pectus amicitiae* is sound, and that we should look elsewhere in the verse for the corruption; and as *nostrae* pectus amicitiae has no meaning,

it is *nostrae* which is corrupt. *Nostrae* here might be very well given by mistake for *non verae*, especially after *nostrae* in the preceding verse. 'O thou who art the cruel poison of my life, and not, as I once thought, a heart of faithful friendship.'

In that difficult line in the seventy-ninth poem, 'Si tria natorum savia reppererit,' *O* alone gives *notorum*, and I agree with Mr. Munro and Baehrens, that it is right. The meaning is, 'Let this handsome fellow sell up Catullus and his house, if he can find three acquaintances who would pollute themselves by kissing his foul mouth.'

In lxxxiii. 6, *loquitur* should, I think, be *queritur* (*oritur*, *O*).

Mr. Ellis is almost the first editor since Scaliger's time who has regarded the eighty-seventh and seventy-fifth as two separate tetrastich poems. Scaliger thought they formed one poem of eight lines, which had accidentally been broken in two, and wrote them thus:—

Nulla potest mulier tantum se dicere amatam
 Vere, quantum a me Lesbia amata mea es.
 Nulla fides nullo fuit unquam foedere tanta,
 Quanta in amore tuo ex parte reperta mea est.
 Nunc est mens diducta tua, mea Lesbia, culpa,
 Atque ita se officio perdidit ipse pio,
 Ut iam nec bene velle queam tibi si optima fias,
 Nec desistere amare, omnia si facias.

Scaliger was led to this happy conjecture by the fact that his MS., the Cuiacianus (my Perusinus), gave *nunc*, not *huc*, in the first line of the seventy-fifth. But all good MSS. give *huc*, and *deducta*, changed by Scaliger to *diducta*. And so Mr. Ellis, after a careful comparison of many passages where *deducere* is used with *huc* has come to the conclusion that both *huc* and *deducta* are sound, and

that the poems are distinct, and ought to be kept separate. In this he is followed by Baehrens. But even if we read *huc* and *deducta*, which we must do, might we not still regard the poem as one? The first four lines seem, if read by themselves, to want a conclusion sadly.

LXXXVIII. 8.

Nam nihil est quicquam sceleris quo prodeat ultra.

Here I think *quisquam* should be read for *quicquam*—
'Nihil est ultra, quo sceleris quisquam prodeat.'

XCI.

I should not like to leave out the ninety-first poem, although I have no critical remarks to make concerning it. But when I have printed so many of the masterpieces of Catullus, I cannot fairly omit one which is the most perfect masterpiece I know of bitter reproach—

Non ideo Gelli sperabam te mihi fidum,
In misero hoc nostro hoc perduto amore fore,
Quod te cognossem bene constantemve putarem,
Aut posse a turpi mentem inhibere probro,
5 Sed neque quod matrem nec germanam esse videbam
Hanc tibi, cuius me magnus edebat amor.
Et quamvis tecum multo coniungerer usu,
Non satis id causae credideram esse tibi.
Tu satis id duxti: tantum tibi gaudium in omni
10 Culpa est, in quacumque est aliquid sceleris.

The second line here is perhaps the most rugged in Catullus, and is a verse which Ovid would not have published for a good deal. But it is, for all that, a magnificent verse, and not far short of being the very finest line that has come down to us from the pen of Catullus. The elisions add to the effect, and must have been intentional.

But the sweetest couplet in Catullus is the following, lxxii. 3 :

Dilexi tum te non tantum ut volgus amicam,
Sed pater ut gnatos diligit et generos.

I suppose all lovers have felt so, and have also supposed their feelings to have been unique in the history of the passion. But no one has expressed this feeling like Catullus in these simple words. It is marvellous, is it not, that a boy from a provincial town should have thus been able to describe the nature of his love for a proud aristocrat like Clodia—a woman older than himself—a woman whose passions were as ungoverned as her fascinations were unequalled? It is marvellous, but it is true to nature, and to fact.

That Lesbia was Clodia, wife of Metellus Celer, the notorious sister of the notorious Publius, ought, I think, to be accepted as a fact. The evidence for this supposition, both external and internal, is very strong. We are told distinctly by Apuleius that Lesbia was a *pseudonym* adopted by Catullus for Clodia, and the statement falls in with all that we learn from Cicero about Clodia, and from Catullus about Lesbia. Mr. Ellis, without declaring himself on either side, has carefully recapitulated the arguments, and leaves nothing to be added to what he has said. Mr. Munro strongly advocates the theory, for which the main arguments are the following :—We have, in the first place, the direct statement of Apuleius : then the name *Lesbia*, if used to disguise *Clodia*, agrees with the law, that poetical pseudonyms should be metrically equivalent to the real name. Lesbia was married. So was Clodia. Lesbia was very fond of Lesbius. Clodia was too fond of her brother Clodius. Catullus (in a most marked manner) calls Lesbius *pulcher*. Clodius' surname was *Pulcher*, and Cicero calls him *pulchellus puer*. Lesbia was a woman of great

fascination. Clodia is called *βωῶπις* by Cicero—an epithet which seems to describe a commanding queenly Juno—just such a woman as we should imagine Lesbia to have been. If there be a further allusion to the fable that Juno was both wife and sister of Jove, Cicero's use of the word tends still more strongly to support the theory. Lesbia is described by Catullus as having sunk to the lowest depths of profligacy.¹ Cicero alludes to a nickname of Clodia which suits the lowest class of strumpet.² One Rufus supplanted Catullus in Lesbia's affections. Caelius Rufus had an amour with Clodia; and how well the description of Clodia's character given by Cicero in his oration in defence of that Caelius suits all that we know and can imagine of Lesbia, especially the following sentence, which makes us say alas! for Catullus:—*'quae etiam aleret adolescentes et parsimonias patrum suis sumptibus sustentaret.'* So much for the positive evidence. But the negative fact, that there is nothing whatever that tells against the theory that Lesbia and Clodia were one and the same, in the writings of either Catullus or Cicero, is of no small weight. There are many confident statements in Mommsen's Roman history that depend upon evidence much weaker than that on which the identification of Lesbia with Clodia rests. That they were the same person I regard 'as already proved,' and I believe 'it will go near to be thought so shortly.'

The speech in defence of Caelius is one of Cicero's most interesting orations. If the account of Clodia's character there given is a true one, Clodia was indeed a wicked woman, a *vere pessima puella*, a beautiful tigress—the true predecessor of Messalina and Faustina, and of all those hot, voluptuous Italian beauties whose loves and hates have added such lurid colours to the history of that

¹ lviii. 5, *Nunc in quadriuiis et angiportis cet.*

² *quadrantaria*.

country. A 'matrona potens,' with wealth at her command, she lived for the gratification of her desires. She constructed a swimming bath in the Tiber, close to her villa, and selected her paramours from the young men who frequented it. She entrapped Caelius, a youth of rising promise, in her snares, and quarrelling with him, instigated young Atratinus to try and work his ruin, on the capital charge of attempting to poison Dion, the Alexandrian envoy. Cicero, in his defence, says he wonders that she dares mention the word poison, and more than hints that she brought about her husband's end by that means. In one of his very best passages he thus describes the death of Metellus:—

'Vidi enim, vidi, et illum hausi dolorem vel acerbissimum in vita, cum Q. Metellus abstraheretur e sinu gremioque patriae, cumque ille vir, qui se natum huic imperio putavit, tertio die postquam in curia, quam in senatu, quam in republica florisset, integerrima aetate, optimo habitu, maximis viribus, eriperetur indignissime bonis omnibus, atque universae civitati. Quo quidem tempore ille moriens cum iam ceteris ex partibus oppressa mens esset, extremum sensum ad memoriam reipublicae reservabat; cum me intuens flentem significabat interruptis atque morientibus vocibus, quanta impenderet procella urbi, quanta tempestas civitati: et cum parietem saepe feriens eum, qui cum Q. Catulo fuerat ei communis crebro Catulum, saepe me, saepissime rempublicam nominabat, ut non tam se emori, quam spoliari suo praesidio cum patriam tum etiam me, doleret . . . Ex hac igitur domo progressa ista mulier, de veneni celeritate dicere audebit?'

We must hope that the orator's dark insinuation was without foundation, and only used as a rhetorical weapon in defence of his client; and that the woman whom Catullus loved, 'quantum amabitur nulla,' was guiltless of the worst of crimes.

In the translation of Callimachus' elegy on Berenice's

hair, the Coma describes her position among the stars thus (lxvi. 65-68):—

Virginis et saevi contingens namque Leonis
Lumina, Callisto iuxta Lycaoniam,
Vertor in occasum tardum dux ante Boöten
Qui vix sero alto mergitur oceano.

Mr. Ellis retains the MS. reading *iuxta*, and defends the short *ā* by *contrā* in Ennius. But *contrā* in Ennius will not excuse *iuxtā* in Catullus. I thought of reading *laevi*, instead of *saevi*, with *Leonis*, and *dextra* instead of *iuxta*. Thus the position of the Coma would be exactly described. It is on the left of Leo, on the right of Ursa Major (Callisto). But *iuncta Lycaoniae*, the conjecture of Parthenius, is very probable, and I find Seneca uses *iunctus* of the constellations, Thyest. 875,

Magnoque minor iuncta draconi.

The 59th line of the same poem has been handed down to us in a desperate state of corruption in the MSS. The copyists seem to have been afraid of attempting to reconstruct the verse, and have been contented with preserving the archetypal corruption. L. Mueller follows their example, and prints thus:—

† Hi dii uen ibi vario ne solum in lumine caeli . . .
Ex Ariadneis aurea temporibus
Fixa corona foret, sed nos quoque fulgeremus
Devotae flavi verticis exuviae, *cet.*

Mr. Ellis reads with daring and ingenuity from his own conjecture:—

Hic iuveni Ismario ne solum in limine caeli
Fixa corona foret *cet.*

Bacchus is the Ismarian youth who fixed the Gnosia corona, Ariadne's diadem, among the stars. But Mr. Ellis has not been able to show that Bacchus was ever called Ismarius by the Latin poets, or, indeed, that Ismarius was ever applied as a general epithet to wine. The wine of Ismarus, or Ismara, was called Ismarian of course. This was the wine which Ulysses carried with him from Ismarus, and with this wine he made Polyphemus drunk, and hence Propertius talks of the Ismarian wine in connexion with this episode. But, I repeat, Ismarian wine was not a Latin common-place, and Bacchus could not be called Ismarius iuvenis. Of all the emendations recorded by Mr. Ellis, none pleases me so much as Conington's simple *Advena*. But we ought probably to change *solum* to *sola in*.

The verses 77-82 of the same poem appear thus in Mr. Ellis's text:—

Quicum ego, dum virgo quondam fuit omnibus expers
 Unguentis, una milia multa bibi.
 Nunc vos optato quos iunxit lumine taeda,
 Non prius unanimis corpora coniugibus
 Tradite nudatas reiecta veste papillas
 Quam iocunda mihi numera libet onyx.

'Omnibus expers unguentis' is obviously ungrammatical, as well as absurd. Doering reads, 'omnibus explens se unguentis,' a conjecture which Mr. Munro approves. But Lachmann's reading of the second verse—

Unguenti si una milia multa bibi—

seems to me unquestionably right. *Milia*, by itself meaningless, demands a genitive after it, and what is more, a genitive singular. Cf. lxi. 215, *supra*, 'multa milia ludi.' Hor. Sat. I. i. 45, 'Milia frumenti tua triverit area centum.'

There is a corruption then in *omnibus expers* which I do not pretend to emend. I would have proposed,

Quicum ego dum virgo quondam fuit, omnibus et spes,
a conjecture based on Ovid, Met. ix. 10, '*quondam pulcherrima virgo* multorum que fuit *spes* invidiosa procorum,' but for the fact that Catullus does not allow *et* to be the second word of a sentence. Still I fancy *spes* may be right, and the corruption may lie in *omnibus*.

C.

Caelius Aufilenum et Quintius Aufilenam
Flos Veronensum depereunt iuvenum,
Hic fratrem, ille sororem. Hoc est quod dicitur illud,
Fraternum vere dulce sodalicium.
Quoi faveam potius? Caeli, tibi: nam tua nobis
Perspecta est *igni tum* unica amicitia,
Cum vesana meas torreret flamma medullas.
Sis felix, Caeli, sis in amore potens.

6. Perfecta est igitur est, *O.* perfecta est exigitur est, *G.* perfecta exigitur ed. *Pr. Ellis.* perfecta exhibita est, *Lachmann.* perspecta est signis, *Froelich,* perspecta egregie est, *Bachrens.* perspecta est igni tum, *scripsi.*

Catullus, I think, says to Caelius that he takes his side because he had once proved his friendship to him: his friendship, he says, had been tried in the fire. In the oration Post Red. in Senat., attributed to Cicero, ix. 23: "Alio transferenda mea tota vita est ut bene de me meritis referam gratiam, amicitias *igne perspectas* tuear." Even if this oration be a forgery, it is a very early one; and whether it be a forgery or not, it shows that the Romans used the expression *igne perspectus*, just as we say "tried in the fire." It is easy to say how near *perspecta est igni tum* is to *perfecta est igitur*. The elision will offend no one who knows how fond Catullus is of elisions in his pentameters.

In cxiv. 6, there is something wanting—

Quare concedo sit dives dum omnia desint:
Saltum laudemus, dum modo ipse egeat.

I propose

Saltum laudemus dum modo *homo* ipse egeat.

I do not think this is at all contradicted, but rather supported, by the last line of the next poem, which is an attack of the same sort on Mentula (probably Mamurra), where he is thus described—

Omnia magna haec sunt, tamen ipsest maximus *auctor*:
Non homo sed vere mentula magna minax.

Catullus corrects himself, as it were. 'I called him contemptuously *homo*; but, after all, that is not his true appellation.' I have substituted *auctor* for *ultor* of the MSS. *Auctor* meant the person who had the right to sell a thing; hence the legal owner. *Auctoritas* was the right of ownership. Ovid, who was fond of legal expressions, uses *auctor* when speaking of the owner of the cow into which Io was transformed, Met. i. 615. Therefore Catullus here says, 'These are all big things, but the owner is biggest of all.' None of the conjectures recorded by Mr. Ellis are satisfactory, and Mr. Munro's *ut re* is scarcely more likely than Baehrens' *horum*.

In concluding this very imperfect review of a most valuable work, I must express my regret that I have not been able to do Mr. Ellis anything like justice. I have directed my attention rather to attempting the solution of a few critical points, where Mr. Ellis had left something to be attempted by others, than to bestowing praise on the many passages where he has said everything that could be said. In particular, I have left his commentary almost unnoticed. This has arisen chiefly from the fact

restoration of the text is much more interesting to myself personally than explanation of it, and I have devoted all the time and space I had to spare to criticism, and left none for exegesis. And it would be presumptuous for me to attempt to add anything to the vast and varied store of illustration gathered into Mr. Ellis's commentary. Indeed, if I felt disposed to find any fault with it, it would be that it is too copious. It is owing to Mr. Ellis's desire that his remarks should be as full as possible that he has sometimes written notes where none are necessary, and has not altogether avoided the danger of elaborate commentaries, namely, over-refinement. But this occurs seldom. And the reader will easily pardon it when it does occur, in gratitude for the ample aid afforded him when he is confronted with real difficulties.

But valuable as the commentary is, the first volume, I repeat, with its critical apparatus, is far more valuable. On this volume Mr. Ellis's reputation is most surely based; and from the publication of this volume it is that a new era for Catullus must be dated. And in spite of the hard knocks he has sustained from both scholars, Mr. Ellis may fairly regard as the fruit of his own grafting both the edition of *Æmilius Baehrens* and the *Criticisms and Elucidations* of Mr. Munro.

ARTHUR PALMER.

ΜΥΣΤΙΚΩΤΕΡΑ.

THE following passages from Cicero's Letters to Atticus are difficult, by reason of the covert way in which the meaning is conveyed. In most of them this obscurity was intentional. Cicero did not wish to speak too plainly, as he felt he was on dangerous ground. Hence I have used as a title for this Paper the term which Cicero himself employs for these cautious and enigmatic communications.

ATT. v. 4, 2.

De illo quod Chaerippus (quoniam hic quoque πρόσθεν σὺν sustulisti), O provincia ! etiamne hic mihi curandus est ! curandus autem hactenus ne quis ad senatum *consule* aut *numera*.

Cicero was now on his way to his province. The Senate were almost unanimously of opinion that, in view of an apprehended struggle with Parthia, the legions of Cicero (as well as those of Bibulus, who was governor of Syria) should be considerably strengthened (Fam. iii. 3, 1). One of the consuls, Sulpicius, declared that he would oppose such a step ; but Atticus seems to have used his influence with the other consul, Marcellus, to bring the matter before the Senate, and Cicero says that he feels confident that the *Scutum* will pass. Now, Chaerippus, a Greek, who had been in the train of Q. Cicero in Asia (Q. Fr. i. 4, 14), at this time had requested Atticus to induce Cicero to do for him some service, of the nature of which we are ignorant. Cicero here intimates that he must accede to the request of Chaerippus, lest he (Chaerippus) should move some senator in Rome to impede the

passing of the *Sctum* by those means which were usually employed by ancient Roman "Obstructives." The passage then, as usually understood, may be rendered thus:—

"As to the request which Chaerippus made of you (since in this case, too, you have suppressed your own *penchant* on the subject) —Oh, what a burden is a provincial government! Must I look after such a fellow as that? Yes; I must: at least, so far as to avert from the *Senatusconsultum* those hated words of obstruction, *consule* or *numera*."

In these last words lies the great difficulty of the passage. The words are usually interpreted "move the previous question" and "count out the house." These interpretations rest on a passage of Festus, which I add—

"*Numera senatum*" ait quivis senator consuli quum impedimento vult esse quominus faciat *Sctum*, postulatque ut aut res quae afferuntur dividantur, aut simul consulantur, aut, si tot non sunt senatores quo numero liceat praescribi *Sctum*, expectentur.

Now, this sentence from Festus, even as it stands, only explains the phrase *numera*, which is easy, and not the phrase *consule*, to which the commentators have ascribed a meaning which I do not hesitate to say it could not possibly bear, when they translate *consule* "move the previous question." Anyone, however, who reads carefully the passage from Festus will see that, as it stands, it is hardly consistent with itself, for it first gives *numera senatum* as the only obstructive *formula*, and then afterwards reckons it as one of three *formulae*. For *aut, si tot non sunt*, &c., read *UT, si tot non sunt*, and then the sense is clear. *Ut* was erroneously assimilated to the preceding *aut . . . aut*. The passage will then run as follows (*consulantur* being also corrected to *consulatur* in the interests of Latin, and the punctuation being reformed):—

"*Numera senatum*" ait quivis senator consuli (quum impedimento vult esse quominus faciat *Sctum*, postulatque ut aut res quae

afferuntur dividantur, aut simul consulatur), ut, si tot non sunt senatores quo numero licet praescribi *Sctum*, expectentur.

Which may be paraphrased thus:

"Count out the house," says any senator to the consul (when he wishes to impede a *Sctum*, and wants to have questions which are lumped together considered separately, or *vice versa*), so that, if there be not present the requisite number of senators, the *Sctum* cannot be carried, unless they come."

Accordingly, I believe that *consule*, in the passage from Cicero, is wrong; that we have a clue to the right word in the passage from Festus, where he says *ait quivis senator CONSULI*, and that the last words of the passage from Cicero should run as follows:—

Ne quis ad senatum CONSULI AIAT "numera,"

"lest anyone in the Senate should say to the consul the (obstructive) word *numera*."

For *ad senatum* compare *ad iudices*, *ad parentem*, Cic. pro Lig. 30. So *ad subsellia ad curiam*, *ad populum*; and in Livy, *ad plebem (criminum)*, "accusations before the people," Liv. v. 20; so *ad hostes*, vii. 7; x. 29. For *aiat*, cf. Fin. ii. 70.

For those who will not accept this correction of the text of Festus, I would repeat that they must not suppose that *consule* (in the letter of Cicero) is in any way defended by the passage from Festus, corrected or uncorrected. *Ut res simul consulantur* is not Latin for *ut de rebus simul consulatur*; but even after we have corrected to *consulatur*, so that the sentence runs, *postulatque ut aut res quae afferuntur dividantur aut simul consulatur* (i.e., "that it be deliberated;" *sc. de iis rebus*), even then we have no defence for *consule* in the letter of Cicero, which, if it is to gain any light from the passage of Festus, should be

simul consule or *divise consule*;¹ for be it observed that, as addressed to the consul, *consule* can only mean "put the question," not "put the previous question," or "put another different question"; and surely, if the question was, whether the forces under command of the pro-consuls should be augmented, the worst way of obstructing the passing of *Scutum* would be to cry "consule," "put the question." To cry to the consul *simul consule*, if the question already put referred only to Cicero, or only to Bibulus, would have an obstructive effect, for that would be in effect to ask the consul to put a new question, but to cry *consule* would be unmeaning. The fact is, that because *simul consulantur* (or rather, *consulatur*) is found in the passage from Festus, it is hastily supposed that *consule* of Cicero's letter is somehow explained. Whereas, as a matter of fact, the passage explains only *numera*, and refers to only one sort of obstruction, mentioning, however, the cases in which this obstruction was usually resorted to.

CIC. AD ATT. v. 20, 4.

Venit interim Bibulus. Credo voluit appellatione hac inani nobis esse par. In eodem Amano coepit loreolam in mustaceo quaerere. At ille cohortem totam perdidit centurionemque primi pili, *nobilem sui generis*, Asinium Dentonem.

Boot explains the italicised sentence to mean *non illustri loco natum, sed qui sua virtute inclaruit*. But why should Cicero state this fact here, and amid his sneers at Bibulus? And is *nobilem sui generis* a possible way of expressing "not of noble birth, but ennobled by his own qualities"? On the other hand, there is no reason why one of the family of Asinius Dento should not have held a curule office—no reason, therefore, why Asinius Dento should not

¹ The word actually used in this by Ascon in *or. pro Mil.* case was "*divide*," as we are told

be *nobilis*. The position of a *centurio primi pili* was a distinguished one. Does it not seem more likely that Cicero here falls into his invariable habit of punning on names? *Asinium* lends itself to a play on the word *asinum*. He lost a noble of his own kidney, after his own heart, in *Asinius* Dento. The ass, it need not be remarked, was a type of stupidity with the Romans, as well as ourselves. *Scio me asinum germanum fuisse* is the reflection made by Cicero on his own conduct in Att. iv. 5, 3.

My rendering, it may be observed, involves the more normal use of *sui*; however, the use of *sui*, implied in Boot's view, is of course quite unobjectionable.

CIC. AD ATT. v. 21, 5.

Cave putes quicquam homines magis umquam esse miratos quam nullum teruncium, me obtinente provinciam, sumptus factum esse nec in rempublicam nec in quemquam meorum, praeterquam in L. Tullium, legatum. Is, ceteroqui abstinens [sed], Iulia lege *transita*, semel tamen in diem, non, ut alii solebant, omnibus vicis [praeter eum semel nemo accepit] facit ut mihi excipendus sit cum teruncium nego sumptus factum; praeter eum accepit nemo.

The passage *praeter eum semel accepit nemo* must of course be omitted. Then, with the exception of the one italicised word, the sense of the rest is clear. *Transitam*, which makes no sense, is the reading of *M*. Some edd. correct to *transitans* (α ὑπαξ εἰρημένον), in the sense of "on his passage from town to town throughout the province"; others read *transita*, understanding *Iulia lege transita* to mean "in transgression of the Julian law." All agree about the unsoundness of the passage enclosed between brackets. The passage then (reading *transita* with the best editors) would be rendered thus:—

"He, though in other respects abstinent, yet, by transgressing the Julian law—and that once only each day, not, as others used

in every hamlet—causes me to make exception of him when I say that not a farthing of expense was incurred by the provincials; nobody else besides him accepted anything.”

But though the meaning of the whole passage is clear, the expression is far from satisfactory.

Iulia lege transita . . . facit ut mihi excipiendus sit is made to mean, “by violating the Julian law . . . he causes me to make an exception in his case.” Few students of Cicero will accept this as a Ciceronian sentence. I propose, in place of the sentence enclosed within brackets, to insert one word, which in itself would account to some extent for the presence of the unsound words. The word I propose to insert is *EXCEPTUS*, *entertained*. Thus (if we read *est* after *abstinens* with Boot, and preserve *sed* of the MS, which is usually omitted) the sentence would run as follows:—

Is, ceteroqui abstinens est; sed, Iulia lege transita (semel tamen in diem non ut alii solebant omnibus vicis) *EXCEPTUS*, facit ut mihi *excipiendus* sit cum teruncium nego sumptus factum.

There is a play of a most Ciceronian kind on the words *exceptus* and *excipiendus*, and the passage should be thus rendered, though the play on the words suffers a little in the translation:—

“He is abstinent in other respects; but *by accepting entertainment* (*exceptus*), in violation of the Julian law—and that once only each day, not, as others used at every hamlet—forces me to *make an exception* of him, when I say that not a farthing’s expense was incurred by the provincials.”

The Julian law (carried by Cæsar in his first consulship) forbade Roman governors, when travelling in the provinces, to accept anything from the provincials without compensation, except wood, salt, and hay.

It would be tedious and superfluous to enumerate the scores of passages in the Letters where Cicero plays on words. It is not too much to say that he cannot resist a pun.

To me it seems that the *jeu de mots* in the words *exceptus* and *excipiendus* was the sole reason why the affluent Cicero brought out from his treasure-house a phrase so awkward as *facit ut mihi excipiendus sit quum nego*, &c. And this consideration is in my mind a fatal objection to Boot's arrangement, which he now repudiates, but which seems to me far better than the suggestions made by the earlier editors of the Letters. It is as follows:—

Is ceteroqui abstinens est, sed Iulia lege transitans (semel tantum in diem non ut alii solebant omnibus vicis) accepit; ITA facit ut mihi excipiendus sit, &c.

That is:—

He is in other respects abstinent, but on his passage from town to town he accepted gifts (*i.e.*, wood, &c.) under the provisions of the Julian law; therefore I am forced to except him, &c.

Above (v. x. 2) Cicero boasts *nihil accipitur lege Iulia, nihil ab hospite*. He did not even avail himself of the provisions of the Julian law, or of the right of billeting (*ἐπιστάθμια*, as he afterwards calls it).

Against this, however, there lies the objection mentioned above, that the awkward phrase *facit ut mihi excipiendus sit* fails to be accounted for, as well as an objection to the use of *transitans*, which is unexampled and inappropriate.

Boot now repudiates the ingenious arrangement of this passage which he put forward in his Commentary. He now, reading with Francken *pransitans* for *transitans*, would give—

Is ceteroqui abstinens sed Iulia lege *pransitans*—semel tantum in diem non ut alii solebant omnibus vicis—facit ut mihi excipiendus sit, &c.

But it would be impossible *Iulia lege pransitare*, “to accept an entertainment at luncheon, in accordance with the provisions of the Julian law.” The only hospitality which could be accepted in accordance with that law would be a present of wood, salt, or hay.

Iulia lege transita pransitans would be an improvement on the conjecture of Francken, and might be defended on the theory of ἀβλεψία; *transita* and *pransitans* resemble each other so closely in form that one might have dropped out. But the sentence would still be very un-Ciceronian.

CIC. AD ATT. vi. 5, 2.

Ταῦτα οὖν, πρῶτον μὲν ἵνα πάντα σώζῃται· δεύτερον δὲ, ἵνα μηδὲ τῶν τόκων ὀλιγορήσης ἀπὸ τῆς προεκκειμένης ἡμέρας· ὅσας αὐτὸν ἠνέγκαμεν σφόδρα δέδοικα.

This is usually given as above, and may be rendered as follows :—

“You must then, firstly, see that the whole sum be saved; secondly, you must not neglect the interest, reckoning it from the aforesaid day. During (the days) that I had to endure his presence I was greatly alarmed.”

Thus ἡμέρας is understood after ὅσας. But this would be a very strange ellipse. Two courses are open to editors, and neither has as yet, so far as I know, been taken.

Either repeat ἡμέρας,

ἀπὸ τῆς προεκκειμένης ἡμέρας· ἡμέρας ὅσας αὐτὸν ἠνέγκαμεν σφόδρα δέδοικα—

This would add one to the many instances of the effect of that ἀβλεψία which has already been referred to.

Or, read

ἀπὸ τῆς προεκκειμένης· ἡμέρας ὅσας κ. τ. λ.

The ellipse of ἡμέρας (*gen. sing.*) after προεκκειμένης would be quite normal, as in ἡ προθεσμία and such phrases.

CIC. AD ATT. vii. 1, 4.

Contra Caesarem? Ubi illae sunt densae dexteræ.

I have no doubt that the words *ubi . . . dexteræ* are taken from some poet; else why would Cicero use such a word as *densae*? I therefore propose, for the sake of the metre, *either* to transpose *illæ* and *sunt*, or (which I prefer) to omit *sunt*.

I add two short critical notes on Tac. Ann. iv.

TAC. ANN. iv. 26.

Cognitis dehinc Ptolemaei per id bellum studiis, repetitus ex vetusto MORE OMISSUS QUE e senatoribus qui scipionem eburnum, togam pictam, antiqua patrum numera, daret.

For the corrupt words printed in small capitals Döderlein reads—

Repetitus ex vetusto *more honos missusque*, e senatoribus, &c.

This emendation has been generally accepted. I believe, however, that we have here another case of ἀβλεψία. I would read—

Repetitus ex vetusto *mos omissus, missusque*, e senatoribus, &c.

Mos was changed to *more* because the copyist was not familiar enough with Tacitus to see what a characteristic

construction *ex vetusto* is (cf. *ex facili*, *ex adfluente*, &c.), and he thought that *vetusto* should have a substantive in agreement with it. The rest of the emendation illustrates the most common form of ἀβλεψία in copyists; after OMISSUS the copyist overlooked the closely resembling word MISSUS.

TAC. ANN. iv. 41.

Sublatisque inanibus *veram potentiam* augeri.

So all the edd., but the MS has *vera potentia*.

Should we not, then, read *vera potentiae*? This is nearer to the MS; it is a sufficiently difficult construction to account for the corruption, and it is thoroughly Tacitean. Cf. *tacita suspicionum*, in the same chapter; *montium editis*, in ch. 46, &c.

ROBERT YELVERTON TYRRELL.

SOME PASSAGES IN PINDAR AND HOMER.

PINDAR.

I. OL. vi. 61-3.

ἀντεφθέξατο δ' ἀρτιεπῆς
 πατρία ὅσσα μετάλασέν τέ μιν
 " ὄρσο, τέκνον,
 δεῦρο πάγκουον ἐς χώραν ἵμεν φάμας ὀπισθεν."

Μεταλλάω occurs in Pindar in one other passage—

μεμάντευμαι δ' ἐπὶ Κασταλιᾷ
 εἰ μετάλλατόν τι.

PΥTH. iv. 164-5.

It is absurd to make this *I ask if I am to ask*. The context shows it to mean *I ask the Oracle if I am to follow up the dream in any way*. The Oracle, in reply, bids him send a ship. Hence the scholiast rightly makes it = πρακτέον—εἰ ἐρευνητέον τι τούτων καὶ φροντιστέον, ὧν ὁ ὄνειρος καθ' ὕπνου ἐπέθετο, τουτέστιν εἰ πρακτέον.—BOECKH, ii. 361.

The passage gives no notion of *putting questions*.

In Homer its precise meaning has been little attended to, on account of its being found in passages which, taken as wholes, imply inquiry. The notion of questioning is also fostered by the fact that μεταλλάω is often found in company with verbs which properly denote *questioning*. It is besides always easy in English to get a synonym, so we soon acquiesce in repetitions like *ask and inquire*. The surplusage is next justified under some such name as epic iteration, and finally appears on an examination paper as Homeric Epanadiplosis. I think, however, it will be seen that μεταλλάω has in Homer a precise sense of its own,

quite independent of any context, and that this sense will suit the passage in the Sixth Olympic.

I shall refer to the more instructive passages in Homer:—

- A. Αἰνείας δ' ἑταροῖσι μεθίστατο· τοὶ δ' ἐχάρησαν
ὥς εἶδον ζῶν τε καὶ ἄρτεμέα προσιόντα
καὶ μένος ἐσθλὸν ἔχοντα· μετάλλησάν γε μὲν οὔτι,
οὐ γὰρ ἔα πόνος ἄλλος.

E. 514-7.

“They felt joy, but proceeded no further, as they had no time.” They did not show their joy, as the mates of Ulysses did, who had plenty of time.

ἐμὲ κείνοι ἐπεὶ ἶδον ὀφθαλμοῖσιν
δακρύνοντες ἔχυντο.

κ. 412-59.

The description in κ is emphasised by simile. Here μεταλλάω means, as in the fourth Pythian, to *press, urge, or follow up*, and in this sense may be taken in all the passages where it is in company with verbs of questioning:—

- (a). μήτι σὺ ταῦτα διείρεο μηδὲ μέταλλα.

A. 550, ω. 477.

“Do not cross-question (to trap me), nor press (till I relent).”

οὔτ' εἶρωμαι οὔτε μεταλλῶ.

A. 553.

- (b). τοῦτο δέ σοι ἐρέω ὃ μ' ἀνείρειαι ἥδε μεταλλᾶς.

Γ. 177.

“What you ask (his name), and are anxious about.”

Priam had dwelt on the king's appearance and stature, 166-170.

B. This brings us to the next set of examples, where the object of attention is a person:—

- (a). κείνος μέντοι ὃδ' αὐτὸς ἐγὼ, πάτερ, ὃν σὺ μεταλλᾶς.

ω. 321.

“Whom you are anxious about.”

Laertes had only asked the supposed stranger one question about Ulysses—*When did you see him?* He had asked him six or seven direct questions about himself.

(δ). αὐτίκα δ' Ἰδομενεῖα μετάλλα ἄστυδ' ἀνελθών.

τ. 190.

i.e., "He went to the court, and told the people there he wished to see the king."

He did not go about making private inquiries.

(ε). οὓς σὺ μεταλλᾷς.

K. 125.

"Whom you wish to rouse."

"Whom you would like to see in the field."

N. 780.

(δ). νῦν δὴ κάλλιον ἐστὶ μεταλλῆσαι καὶ ἐρέσθαι
ξείνους οἵτινές εἰσι.

γ. 69.

"Now that they have eaten, we may notice them, and ask their names."

(ε). τίφθ' οὕτω πατρὸς νοσφίζεαι, οὐδὲ παρ' αὐτὸν
ἐξομένη μύθοισιν ἀνείρεαι οὐδὲ μεταλλᾷς;

ψ. 99.

"Why don't you question him or notice him?"

Homer explains himself. She says:—

οὐκέτι προσφάσθαι δύναμαι ἔπος οὐδ' ἐρέεσθαι.

Ib. 106.

(ς). οὐκέτι μέμνηται τεθνηότος οὐδὲ μεταλλᾷ.

ο. 23.

"She has no inward regret for the dead man, nor does she affect a show of it."

(ς). ὅς δέ κ' ἀλητεύων Ἰθάκης ἐς δῆμον ἵκηται
ἐλθὼν ἐς δέσποιναν ἐμὴν ἀπατήλια βάζει·
ἣ δ' εὖ δεξαμένη φιλεῖ καὶ ἕκαστα μεταλλᾷ.

ξ. 126-8.

"She entertains every beggar who tells her lies (of course he lies first), and dwells on each particular, and weeps."

(h). In ρ. 460 Telemachus asks one question—*are the suitors back?* Eumæus answers:—

οὐκ ἔμελ' ἐν μοι ταῦτα μεταλλῆσαι καὶ ἐρέσθαι
ἄστυ καταβλώσκοντα· τάχιστα με θυμὸς ἀνώγει
ἀγγελίην εἰπόντα, πάλιν δεῖρ' ἀπονέεσθαι.

"It was not my business to mind or to inquire about what you ask, as I was in a hurry coming down the town."

In all these cases μεταλλάω means *I have before me some object—thing or person—which evokes some degree of notice, ranging from formal courtesy to passionate grief*. But the use of the verb goes further:—

C. If we suppose that the anxiety about some object passes beyond that object, and influences a person, we have the third use of μεταλλάω.

Τηλέμαχε χρὴ τεύχε' ἀρήϊα κατθέμεν εἴσω
πάντα μάλ'· αὐτὰρ μνηστήρας μαλακοῖς ἐπέεσσιν
παρφάσθαι, ὅτε κέν σε μεταλλῶσιν ποθέοντες,
"ἐκ καπνοῦ κατέθηκ."

τ. 4-7.

When they press you. Here there is no cross-examination. The proposition need not be interrogative, even in form—*We must know where you've put away the arms*.

These are the principal passages in Homer. μεταλλάω takes an immediate accusative—person or thing—and a more remote accusative of the person affected by the immediate accusative, expressed or understood.

To apply this to Ol. vi. 61, sqq.:—It is night, and so the god is heard, not seen. ἀντεφθίγξατο expresses only the notion that the *sound* of the Divine Voice is the counter-sound to the sound of the prayer of Iamus. And the sound comes *à propos*, ἀρτιεπῆς, of the prayer; and it *presses* Iamus μετάλλασέν τέ μιν. But as it is a voice, the

pressure which it exerts is a cry or call to Iamus to follow the voice, ὄρσο φάμας ὀπισθε, so we may render it, *The voice came and called him, saying*, "Follow me." In brief, ἀντεφθέξατο gives us the counter-sound;¹ ἀρτιεπής, its appropriateness, and μετάλλασέν τέ μιν, its effect on Iamus.

The main difficulty is caused by ἀντεφθέξατο. This being taken as *answered*, joins on with ὄρσο, so that μετάλλασέν τέ μιν is surplusage. So the scholiast *rec.* τὸ δὲ μετάλλασέν τέ μιν δια μέσου . . . τὸ δὲ ἀντεφθέξατο πρὸς τὸ ὄρσο ἔχει τὴν δύναμιν, and, to get rid of the surplusage, he makes Iamus the subject and μιν Apollo. All embarrassment is removed by recollecting that ἀντεφθέξατο more properly suggests sound than sense: cf. ψαλμὸν ἀντίφθογγον, Fr. 91, 3. It is obvious, if we say *The voice answered*, we want no more; but it is quite another thing to say, *Then came the father's voice, and it called him, saying, Follow me.* Here the sense is not complete without μετάλλασέν τέ μιν, but is quite complete with it. The scholiast *rec.* takes ἀρτιεπής, rightly, as παραυτίκα τῶν ἐκείνου λόγων.

Curtius, Gr. Et. 540, is inclined (after Kvicala) to connect μεταλλάω with ἰ-άλλω, to *hasten—send—shoot*. If this be so, μεταλλάω would be, strictly, to *press*, or *urge*, μετὰ as in μετέρχομαι expressing *quest, finding, capture*, and *appropriation*. And in this way etymology would agree with the result above given.

That μετάλλασέν τε μιν presents considerable difficulty may be seen from the diversity of explanations:—

- (a). ἐπεξήγησέ τε αὐτὸν καὶ ἐν φροντίδι ἔσχεν. Schol. Vet.
- (b). ἐφιλοφρονήσατο. Schol. Rec.
- (c). Qui . . . quaerit aliquid, curat, cordi habet, amplectitur. BOECKH.
- (d). Quaerimus eum quem volumus ad faciendum quid adhibere. HERMANN.

¹ Encounter me with orisons, Sh. Cymb.

Hermann afterwards proposed to read *μεταλλάσαντί ἰν*, a strange position for a participle in the dative.

(e). interrogat ubinam sit. TAFEL.

Tafel compares Jehovah's asking Adam where he is.—*Gen.* iii. 9.

(f). Quidni haec vox, per noctis tenebras tendens ad filium dilectum, dici possit quaerere eum?—DISSEN.

(g). *Schneidewin* follows *Rauchenstein's* defence of Hermann's *μεταλλάσαντί ἰν*, Quaerenti eam. *Schneidewin* and *Donaldson* give Hermann's conjecture as *μεταλλάσαντι*: *Bergk* as *μεταλλάσσαντι*. *Thiersch* appears to have confounded it with *μεταλλάσσω*, for he makes it *μετώκισεν*.

(h). ad se advocat; nam Apollo est in Cronio Colle. An *πειρᾶν*?—EMPER.

(i). *Donaldson*, following *Buttmann*, *addressed*.

(j). Verba manifesto corrupta. . . . sententia institutae conveniens *μετάνστασεν*, sed emendatio incerta.—BERGK, 4th ed. 1878.

Conjectures as given by *Bergk*, *ib.*:—

μεταλλάσσαντί ἰν. HERMANN.

ιν. RAUCHENSTEIN.

μεταλλάσσαντι ἄνορσο. HARTUNG.

μέγ' ἄμνασέν τε ἰν. SCHMIDT.

II. OL. vi 71-6.

ἐξ οὗ πολὺκλειτον καθ' Ἑλληνας γένος Ἰαμιδᾶν
 ὀλβος ἅμ' ἔσπετο· τιμῶντες δ' ἀρετὰς
 ἐς φανεράν ὁδὸν ἔρχονται· τεκμαίρει
 χρῆμ' ἕκαστον. μῶμος ἐξ ἄλλων κρέμαται φθονεόντων
 τοῖς οἷς, κ. τ. λ.

"The Iamidæ are of note: they are wealthy too; but it is to well-doing they owe their place: each event leaves its mark: *e.g.*, envy is the sure result of success in racing."

τεκμαίρει = τέκμαρ ποιεῖ; χρῆμα here is the race, and φθόνος is its τέκμαρ. The single word τεκμαίρει condenses Hesiod's

δειλῶν τε καὶ ἐσθλῶν τέκμαρ ἐναργές.

Fr. 110 Gött.

Χρῆμα in the singular occurs in two other passages in Pindar. In each it means event or circumstance—

ἀνευθε θεοῦ . . .

. . . χρῆμ' ἕκαστον.

"Each godless venture."

τὸ δὲ πρὸ ποδῶς

χρῆμα πᾶν.

"That which before us lies."

In all three, it is man's dealings with passing environment.

With regard to the reading: χρῆμ' ἕκαστον τεκμαίρει is the major, and μῶμος ἐξ, κ. τ. λ., is the minor. δὲ is not therefore wrong, but its omission in such a case is Pindaric, or rather lyric: see Dissen, *Excursus*, ii. p. 348, ed. 1843.

III.—OL. vii. 53.

δαέντι δὲ καὶ σοφία μείζων ἄδολος τελέθει.

A gnome. The truly wise man believes that in the true wisdom there is no guile; δαέντι is he who apprehends the

criterion of σοφία; the criterion is to be ἄδολος, and so relatively to ὁ δαίς, ἄδολος σοφία is μείζων than its opposite σκολιαὶ ἀπάται.

So in the second Pythian the criterion is relative to the percipient—

καλός τοι πίθων παρὰ παισὶν, αἰεὶ
καλός. ὁ δὲ Ῥαδάμανθους εὖ πέπραγεν.

The fool loves what is low, but he that is wise hath chosen the better part.

IV.—OL. xiii. 38-9.

τρία ἔργα ποδαρκῆς
ἡμέρα θῆκε κάλλιστ' ἁμφὶ κόμαις.

ποδαρκῆς refers not directly to swiftness, but to the endurance that was able to run and win three races in one day.

V.—PYTH. iv. 109.

λευκαῖς πιθήσαντα φράσιν,

“Following his base instinct.”

If φρένες ἀμφιμέλαιναι, P. 499, 573, be the high heroic heart, the opposite would be φρένες λευκαί: cf. μελάμπυγος, of temper—

μή τευ μελαμπύγον τύχης.

Archil. fr. 110, Bergk, Anthol. Lyr. 2nd ed.

VI.—PYTH. vi. 145-6.

Μοῖραι δ' ἀφίσταντ', εἴ τις ἔχθρα πέλει,
αἰδῶ καλύψαι.

“The fates decline to conceal the scandal of family quarrels.”

i.e., as a necessary consequence, the scandal of family quarrels cannot be hushed up.

Jason continues:—

οὐ πρέπει νῶν χαλκοτόροις ξίφεσιν
οὐδ' ἀκόντεσσιν μεγάλην προγόνων τιμὰν δάσασθαι. . . .
τὰ μὲν ἄνευ ξυνᾶς ἀνίας
λύσον ἄμμιν.

As to the construction, ἀφίστανται καλύψαι, *cf.*

οἱ δ' ἤτοι δακέειν μὲν ἀπετρωπῶντο λεόντων.

Σ. 585.

Verbs of negation may take an infinitive, with or without a negative particle.

Αἰδῶς is a feeling which condemns certain actions :

ἐπὶ γλυκεραῖς εὐναῖς ἐρατὰν βάλεν αἰδῶ.

Venus gives their rapturous union the charm of mutual respect.

ᾠφρα Μηδείας τοκέων ἀφέλοιτ' αἰδῶ.

PYTH. ix. 12.

Venus takes away, by magic, from Medea her feeling towards her parents, which would condemn her for going away with Jason (Pyth. iv. 218). But there is nothing to do this in the case of family quarrels.

VII.—PYTH. iv. 18, 6.

ἀλλ' ἐπὶ καὶ θανάτῳ
φάρμακον κάλλιστον ἑᾶς ἀρετᾶς ἄλιξιν εὐρέσθαι σὺν ἄλλοις.

“Facing, aye, death, to find a tempering of their valour”—an anvil of their sword.

ἐπὶ, c. dat = involving as a consequence, *cf.*—

ἐκρίθη δ' ἔρις, ἃν ἐν Ἰδᾷ κρίνει τρισσὰς μακάρων
παῖδας ἀνὴρ βούτας
ἐπὶ δορὶ καὶ φόνῳ καὶ ἐμῶν μελάρων λώβῃ.

Eur. Hec. 644–6.

φαρμάσσω occurs in the Odyssey, applied to metal:—

ὥς δ' ὅτ' ἀνὴρ χαλκεὺς πέλεκυν μέγαν ἤδ' σκέπαρναν
εἰν ὕδατι ψυχρῷ βάπτῃ μεγάλα ἰάχοντα,
φαρμάσσω· τὸ γὰρ αὐτε σιδήρου γε κράτος ἐστίν.

ι. 391-3.

VIII.—NEM. iv. 51.

Ἀπείρῃ διαπρυσίῃ.

διαπρυσίῃ perhaps contrasts the long continuous line of the mainland with the scattered insular patches. If so, it is only a positive synonym for the negative Epirus, as commonly derived from *ἄπειρος*.

HOMER.

THE following readings aim rather to remove modernisms from the Homeric text than to réstore certainties. In each case the received text carries on the face of it its own condemnation.

I.—WRONG DUAL.

There are three wrong duals in the received text. They are perhaps due to a copyist who did not know that a plural may be used of a twain in harmonious or conjoint action. This will be seen in each case :

I.

K. 364.

λαοῦ ἀποτμήξαντε διώκετον ἐμμανὲς αἰεὶ.

Read:—

δίωκον νωλεμέες αἰεὶ,

Cf.

θῆρε δύο κλονέωσι.

O. 324.

II.

N. 345-6.

τὼ δ' ἀμφὶς φρονέοντε δὴν Κρόνου νῆε κραταιῷ
ἀνδράσι ἡρώεσσιν ἐτεύχετον ἄλγεα λυγρά.

If the verb is dual, it must be ἐτεύχετην: read—

ἔτευχον κήδεα λυγρά.

The plural verb can be used with the dual noun to denote joint action; so of Zeus and Poseidon, *post*, 359.

ἐπ' ἀμφοτέροισι τανύσσαν.

III.

Σ, 582-3.

τὼ μὲν ἀναρρήξαντε βοὸς μέγαλοιο βοείην
ἔγκατα καὶ μέλαν αἷμα λαφύσσετον· οἱ δὲ νομῆες
αὐτῶς ἐνδίσαν ταχέας κύνας ὀτρύνοντες.

Read—

λάφυσσον· τοῖς δὲ νομῆες
αὐτῶς ἐνδίσαν ταχέας κύνας ὀτρύνοντες,

The husbandmen idly set the dogs on the lions, cheering them on.

Cf.

ὥς ἄρα τοῖς of the dual, Λ 120.

IV.

In Hesiod (E, 186) we have

μέμψονται δ' ἄρα τοὺς χαλεποῖς βάζοντε ἔπεσσι.

Hesiod uses the regular dative ἐπέεσσιν in the two other places:

χαλεποῖσι καθαπτόμενος ἐπέεσσιν.

E, 332.

μαλακοῖσι παραιφόμενοι ἐπέεσσιν.

T. 90.

The ending, therefore, cannot be

βάζοντε **Fe**πέεσσιν;

read:

χαλεπήs βάζοντες ἐνιπῆs.

There could not be an elision before **Fe**πος, any more than before λόγος. If the digamma had become obsolete, the difference is small between ΕΠΕCCEI and ΕΝΙΠΕΙC in the old alphabet.

II.—ATTIC ARTICLE.

The so-called *Attic Article* may be easily got rid of, *e.g.*:

(a). φάσγανον ἄμφηκες· τὸ δ' ἐὸν παρὰ νηὶ λέλειπτο.

K. 256.

Read—

φάσγανον ἄμφηκες· **F**ὸν γὰρ παρὰ νηὶ λέλειπτο,

or better,

παρὰ δὲ **F**ὸν νηὶ λέλειπτο.

(b). νείφεμεν ἀνθρώποισι πιφασκόμενος τὰ ἅ κῆλα.

Read—

πιφασκόμενος **Fe**ὰ κῆλα.

M. 280.

(c). παυσάμενον πολέμοιο τὰ ἅ πρὸς δώμαθ' ἰκέσθαι.

Read—

. πολέμοιο **Fe**ὰ

O. 58.

(d). ἀλλὰ πολὺ προθέεσκε τὸ δὴ μένος οὐδενὶ εἴκων.

λ. 515.

Read—

προθέεσκε **Fe**δὸν.

III.—MISCELLANEOUS.

1. Z, 152-1; Y, 212-3.

ὄφρ' εὖ εἰδῆs

ἡμετέρην γενεήν πολλοὶ δέ μιν ἄνδρες ἴσασιν.

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Cobet shows that *Fiδέης* is the subjunctive form. Read,

ὄφρα *Fiδῆσθα*

ἡμετέρην γενέην πολλοὶ δὲ *Fiσασί* μιν ἄνδρες ;

ῖσασι is always digammated.

2. O, 207.

ἔσθλόν καὶ τὸ τέτυκται, ὅτ' ἄγγελος αἴσιμα εἰδῆ.

Cobet shows that the Homeric form is *Fiδέη*. Read, therefore,

ὅτ' ἄγγελος αἴσιμα *Fiείη*.

The whole point turns on the tone and tact of the messenger.

Cf.

ἀμείνω δ' αἴσιμα πάντα.

o. 71.

3. Od. α, 10.

τῶν ἀμόθεν γε θεὰ θύγατερ (Διὸς) εἰπὲ καὶ ἡμῖν.

The MSS. omit *Διός*. Read :

τῶν ἀμόθεν, σὺ δὲ *Fiῖσθα* θεά περ, *Fi*εἰπὲ καὶ ἡμῖν.

Cf.

θεῷ περ.

Σ, 518,

and

θεαί ἐστε, πάρεστέ τε, ἴστε τε πάντα.

B. 485.

The *θα* of *Fiῖσθα* became *θεὰ*, and *θεα περ* became *θύγατερ*, which necessitated *Διός*, in despite of the digamma.

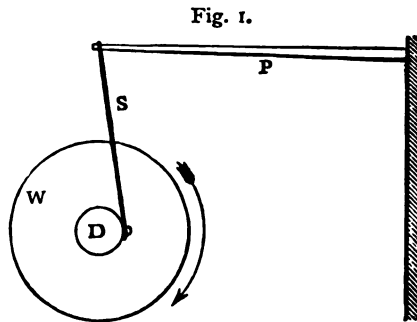
T. MAGUIRE.

NOTES ON THE BACCHAE OF EURIPIDES.

IN Bacch. 1068 *τόρνῳ* has generally been translated *in a lathe*; sometimes it has been supposed to refer to an instrument like a pair of compasses. The following is the whole context :—

λαβὼν γὰρ ἐλάτης οὐράνιον ἄκρον κλάδον
κατῆγεν ἦγεν, ἦγεν ἐς μέλαν πέδον·
κυκλοῦτο δ' ὥστε τόξον ἢ κυρτὸς τροχὸς
τόρνῳ γραφόμενος περιφορὰν ἐλκεδρόμον.

I believe that *τόρνῳ* in this place does mean *in a lathe*, though a very different one from the lathe which was before the minds of the Commentators on the passage.



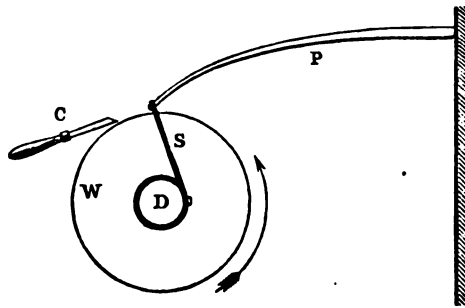
P, Pole. S, String. D, Drum. W, Wheel.

The lathe probably was one such as I have seen at work in the North-west Provinces of India, and of which I here give rough diagrams (see figs. 1 and 2).

A stout pole of some elastic wood is fixed into the wall,

so as to project at right angles, with its thinner end free. To this end is attached a string, which is brought down and fastened to a pin in the drum of the lathe. The workman then attaches the block of timber which is to be turned into a wheel; and he drags this round in the direction of the first arrow, until the string is coiled round the drum as many times as it will go. This of course bends down the pole, which is the process described by *κυκλοῦτο*.

Fig. 2.



P, Pole S, String. D, Drum. W, Wheel. C, Chisel.

Figure 2 represents the lathe with the pole bent down, and the string coiled round the drum of the lathe. When the workman releases his hold of the wheel, the recoil of the pole causes the wheel to revolve in the direction of the second arrow, and the workman then applies the chisel. The process has to be repeated as often as the string becomes completely uncoiled from the drum.

The slow and laboured dragging down of the tree, expressed by *κατῆγεν, ἤγεν, ἤγεν*, would accurately correspond with the slow preparation for the turning process, in a lathe such as is here depicted.

My suggestion is, that the simile in the text is taken from the slow bending of the pole in the process of coiling the string.

The translation then would be, "and it was bent like a

bow, or like *the process*¹ whereby a round wheel has its revolving periphery turned in a lathe." The construction is the same as if we adopt the interpretation which makes *τόρνος* an instrument resembling in its use a pair of compasses. This latter is the explanation given by Mr. Tyrrell, and adopted from him without any acknowledgment by Mr. Paley, in the second edition of his commentary on this play. Indeed Mr. Paley's whole procedure in regard to this passage is very remarkable. In his first edition he accepts the simile of the lathe, apparently for no better reason than that nobody had ever thought it could mean anything else, and seems quite unconscious of any difficulty in the comparison of the slow bending of a tree to the accurate rounding of a wheel by means of a common lathe. As soon as Mr. Tyrrell points out the impossibility of the lathe metaphor, as understood by him, and suggests the simile of an instrument like a pair of compasses, Mr. Paley transfers it to his own commentary, not only without any acknowledgment, but with something very like a sneer. "Mr. Tyrrell is mistaken in saying the ancient wheel (*i.e.* if he means chariot wheel) was solid." But why does Mr. Paley assume that Mr. Tyrrell or that Euripides meant a chariot wheel? And how would it help the simile of the compasses (or of the lathe either) that the wheel should *not* be solid? Surely, whether Euripides meant compasses or a lathe, he must have contemplated a solid wheel, for nobody ever heard of a wheelwright first building up his spoked wheel, and *then* tracing or turning its circumference. Mr. Paley must have been thinking of

¹ It is to be observed that the present participle (*γραφόμενος*), not the perfect (*γεγραμμένος*), is used, so that a process of shaping, not a completed shape, must be referred to. This explanation is unaffected by the question between the three readings, *ἐλκεδρόμον*, *ἐλικο-*

δρόμον, and *ἐλκεῖ δρόμον*. It is in itself probable that the form of lathe used in Greece in the time of Euripides should resemble rather the primitive instrument still surviving in Indian use than the perfect lathe of the English manufacturer.

the well-known prescription for casting a cannon—"take a long round hole, and pour melted brass round it." As a matter of fact, the ancient solid wheel, meaning a cart wheel, survives to this day: it may be seen not only in India, but in Italy and Spain.

This passage is by no means the only one in which Mr. Paley has dealt in a questionable way with other editors. Thus at line 88, in Mr. Paley's first edition (δὲ ποτ' ἔχουσ', κ. τ. λ.), there is a note, "ἔχουσα, *scil.* ἐαυτὴν for οὔσα," supported by a quotation from Aristophanes given by Musgrave. Mr. Tyrrell has clearly proved that Musgrave's quotation is not a case in point, and that the ἔχοντες in Aristophanes was really an elliptic phrase. Mr. Paley's note on this in his second edition runs thus: "ἔχουσα, *scil.* ἐν γαστρί. Matthiae, whose explanation Mr. Tyrrell prefers to that of Musgrave, compares Herod. v. 41, ἔχουσιν," κ. τ. λ. Here the whole point of Mr. Tyrrell's note is quietly set aside in the word *prefers*. Musgrave was wrong, and rested his case on an irrelevant quotation, which, when fully analysed, actually went against him. Either Mr. Paley did not see this, or he was unwilling to admit that he had changed his own view under the influence of Mr. Tyrrell's argument.

Another, and a still more striking instance, is at line 327:

κοῦτε φαρμάκοις
ἄκη λάβοις ἂν οὔτ' ἄνευ τούτων νοσεῖς.

In the first edition Mr. Paley translates, "You cannot be cured by medicine, and yet you are sick to a degree that demands a medicine." Mr. Tyrrell says "Teiresias intimates that he believes Pentheus to be the victim of some aberration of judgment *produced by some artificial means* (οὔτ' ἄνευ τούτων [i.e. φαρμάκων] νοσεῖς). The poet wishes to hint that Teiresias knew the snare into which Pentheus

is being led by the pretended Bacchant." This explanation is actually adopted by Mr. Paley *en bloc* in his 2nd edition, without any acknowledgment whatever to Mr. Tyrrell: "As no drugs will cure you, so it is *by some drugs* that you have been made mad." In this case the translation in Mr. Paley's 1st edition seems positively incompatible with the words of the text. His reticence is therefore quite inexplicable.

Again, in 395, Mr. Tyrrell reads ἐπὶ τοῦτω where Mr. Paley reads ἐπὶ τοῦτου; and in 451 Mr. Tyrrell has μάλνεσθε, where Mr. Paley receives Burges' conjecture, μίθεσθε. In both these cases Mr. Paley, in his remarks in the 2nd edition, altogether obscures the fact that Mr. Tyrrell's readings, as being those of the MS., rest on a wholly different ground from the conjectures Mr. Paley has adopted. In the latter instance, Mr. Paley has partly, and in the former altogether, suppressed the arguments put forward by Mr. Tyrrell in defence of the MS. reading, which he has himself rejected.

Indeed, in connexion with this subject, we remark throughout Mr. Paley's work a want of that appreciation of MS. authority which is one of the principal marks of a judicious commentator. A striking instance of this is at 1060, where for the corrupt words ὅσοι νόθων he mentions no less than four conjectures, some of them as far from the MS. reading as Elmsley's ὅσον ποθῶ, and gives in his text the reading ὅποι μύθων—a reading which would have been received with a smile but for its being supposed to have MS. authority—which MS. authority, however, has been long since proved to have no real existence.

Again, one cannot fail to observe in Mr. Paley's work an absence of that *nudae veritatis amor* which should animate one whose editions are so numerous and so widely read, and who, therefore, wields such a large influence over the progress of classical scholarship in England and

Ireland. If an Editor's views are challenged on good grounds, he is bound to defend them or give them up. Yet such is not the practice of Mr. Paley. He cannot therefore complain if many competent judges regard him as propagating, in edition after edition, erroneous views.

For instance, at verse 36 Mr. Paley, in his first edition, asserts that γυναῖκες means grown-up women, in contradistinction to girls. Mr. Tyrrell remarks that there is no other passage in any Greek author that supports this view. Γυνή is often used of married women, but never indicates grown-up women, whether maids or not. Mr. Paley, in his second edition, simply reiterates his first assertion, making no attempt to set Mr. Tyrrell right, though there is a distinct divergence of opinion. Surely, when Mr. Paley used Mr. Tyrrell's commentary so freely, he was bound either to support his own views in this place or accept Mr. Tyrrell's. There can have been for this omission no such motive as economy of space, seeing that Mr. Paley has devoted half his margin to a quotation in another note from Apollodorus which would have easily borne excision.

In like manner, at verse 1157, there could hardly be a more definite challenge than Mr. Tyrrell's note, "πιστὸν Αἴδαν = *certain death*, is certainly bad Greek." It seems very surprising that Mr. Paley should have omitted to justify his own views here.

On verse 986, for the corrupt ὀριδορύμων of the MS., Kirchoff proposed ὀριδορύμων, believing it to be a word not elsewhere found, though of course formed correctly according to analogy. The word is not given in Liddell and Scott. Mr. Tyrrell points out in Δεύτεραι Φροντίδες (which Mr. Paley must have read, as he quotes it elsewhere) that this word is actually found in Nonnus. Surely this fact, full as it is of significance to an editor really concerned in the attainment of the true text, should have found a place

in Mr. Paley's second edition. It seems almost decisive in favour of Kirchoff's conjecture.

Verse 1353. Here, again, Mr. Tyrrell has committed himself to a definite statement. "Mr. Paley's difficulties vanish before the explanation on verse 1330*b*." Mr. Paley does not admit that they do vanish, nor does he state the reasons why he considers Mr. Tyrrell's explanation insufficient. All he does is to reiterate his former note, adding a brief and rather inadequate summary of Mr. Tyrrell's remarks, and hinting, but not stating, that these remarks do not clear up the obscurity.

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HORAE TACITEAE.

AMONG the numerous versions of the ancient Classics called forth in recent times by the increased importance attached to accurate and idiomatic translation, and the desire to make the writings of antiquity accessible to English readers, few have attained so high a reputation as Messrs. Church and Brodribb's Translations of Tacitus. Critics have been unanimous in their praise, and there lies before me a notice, which may fairly be regarded as representative, that claims for the Translation of the Histories, if not the ideal excellence which reproduces the tone and colour as well as the thoughts of an original, at least the full meed of the accuracy with which Cambridge is accredited, in contrast with the more rhetorical cast of Oxford scholarship. If the translators have wisely avoided the futile attempt to reproduce the peculiar structure of the period of Tacitus, they have, we are told, not the less imitated his nervous diction and 'pregnant brevity,' and have attained success, so far as success is attainable, by the severe exclusion of all unnecessary amplification. In short, we are assured, that a national reproach has been removed, that we have now in the department of historical translation something to take rank with the best works of other nations—to put it tersely, 'an English Louandre'—and the authors are invited to gather laurels in a new field by essaying the great work of Livy.

This is high praise, and, if it be deserved, the translators may well congratulate themselves on having accomplished the profession of their preface, in which, after

stating that it has been their aim 'to reproduce, as exactly as they could, the precise expressions of the Author,' they express their 'trust that, in their revised edition, no actual errors or omissions have escaped them.'

I cannot, I regret to say, confirm this anticipation. A careful examination of the Translation of the Histories has led me to the conclusion that, though it shows a considerable advance on its predecessors, it cannot be regarded as an altogether satisfactory performance, and that it falls far short of the standard of modern scholarship. Not only have the translators neglected to avail themselves of the wealth of criticism and illustration which have of late been lavished upon Tacitus by other German writers, but they have strangely ignored the indispensable edition of Heraeus, which so admirably resumes them. The result is what might be expected—a book disfigured with numerous and grave errors in archæology, and, what is less excusable, in Latin construction. Despite then the verdict of the critics, I am unable to regard this work as monumental. If its authors would be carried down to posterity 'on the shoulders of an immortal,' they must subject it to a much more rigorous revision than that which has resulted in the last edition.

In the following notes—they are little more than extracts from lectures—I have attempted to do something of this kind. They are, as will be seen, quite fragmentary, following the order of the chapters without any regard to unity or grouping of subjects, and the only principle of selection is the accident of dissent, more or less serious, from the renderings of the translators. It so happens, however, that as this dissent is rather diffused, many points of interest to the student of Tacitus are touched on. Unfortunately, the method has this disadvantage, that it leaves unnoticed many felicitous renderings to which, had my plan been different, I might have called attention. I

shall be glad if the reading of the paper will lead our younger students to propose to themselves a somewhat higher standard of translation than that commonly acquiesced in.

1. Simul veritas pluribus modis infracta, primum inscitia rei publicae ut alienae, mox libidine adsentandi aut rursus odio adversus dominantes: ita neutris cura posteritatis inter infensos vel obnoxios.

Then, too, the truthfulness of history was impaired in many ways; at first through men's ignorance of public affairs which were now wholly strange to them; then, through their passion for flattery; or, on the other hand, through their hatred of their masters. *And so between the enmity of the one, and the servility of the other, neither had any regard for posterity.*—C. & B.

(1). Primum . . . mox.

'At first . . . then,' C. & B. Tr.: 'at first—afterward,' or 'in the first place—then.' It is not certain whether the historian wishes to specify the relative importance of co-existing causes, or the order of successive ones: probably the latter. Wölflin has shown, by a very copious citation of instances, that Tacitus uses 'primum' and 'primo' promiscuously in both senses, with a preference, in his earlier writings, for 'primo' before consonants, and 'primum' before vowels (*Philologus*, xxvii. p. 118). In the formula in the text 'primo' is more frequent.

(2). Inter infensos vel obnoxios.

This use of 'inter' has been fully explained by Dräger, *Hist. Synt.* § 273, and by Heraeus on this passage. It is an extension to *concrete* nouns of the classical use of 'inter,'

¹ Messrs. Church and Brodribb's Translation of the 'History of Tacitus' is referred to in the subjoined notes under the initials C. & B.

denoting the circumstances of the case, before *abstract* nouns, as, *e.g.*, in the phrases 'leges silent inter arma' (Cic.), 'natus in libero populo inter iura legesque' (Liv.), and may be resolved by a subordinate adverbial sentence, or by the abl. abs. with the missing participle of 'esse.' It occurs in Livy: cf. 'inter tam suspensos sociorum animos' (*i.e.*, cum tam suspensi essent), Liv. xxiii. 22 ; but it is in Tacitus that we find it most frequent. The following passages collected by Heraeus fully illustrate the use: H. i. 34, 'credula fama inter gaudentes et incuriosos' (*i.e.*, cum omnes essent gaudentes et incuriosi); c. 50, 'utraque vota detestanda inter duos' (*i.e.*, cum duo essent); ii. 92, 'inter discordes' (*i.e.*, cum discordes essent); c. 26, and An. i. 50, 'inter temulentos' (*i.e.*, cum temulenti essent); and the passage in the text, 'inter infensos vel obnoxios' (*i.e.*, cum alii infensi, alii obnoxii essent). The translation of Messrs. C. & B. is inaccurate, and indeed, what rarely happens with them, is scarcely English. They seem to have been misled by the ordinary meaning of the word into thinking that 'inter' implies a contrast, a notion which suggested their mistranslation of 'inter gaudentes et incuriosos,' c. 34 ('between the delight of some and the indifference of others'); but a consideration of the passages cited shows clearly that this is not the case. In that before us there is indeed a contrast, but it lies in the terms 'infensos' and 'obnoxios,' not in the form of expression. Translate (taking a hint from Louandre): 'thus, enemies or slaves (of power), they were alike regardless of after times.' For the sake of perspicuity, it is necessary to introduce in the translation the notion 'adversus dominantes' as the antithesis of 'posteritas.' The overmastering regard of historians to their rulers excluded all thought of after times; but in this they ignored what Tacitus (An. iii. 65) calls 'the main function of history'—to submit vice and virtue to the judgment of posterity.

(3). It may be worth noting, that in the phrase 'inscitia rei pub.' (*i. e.*, practical unacquaintance with public life), 'inscitia,' from 'inscitus,' is used in what is perhaps its strict sense, in contradistinction to 'inscientia' ('the absence of theoretic knowledge'). The distinction, however, is not observed throughout by Tacitus (cf. c. 54, 'per inscitiam ceterorum'), and in fact (Wölflin tells us) the word 'inscientia' is not found in his historical writings. Horace, too, no doubt for metrical reasons, uses 'inscitia' = 'inscientia' (v. Heraeus *in loc.*)

2. (1). *Haustae aut obrutae urbes fecundissima Campaniae ora, et urbs incendiis vastata.*

The peculiar use of 'ora,'—the local abl. is rarely found in nouns of the first declension, unless with some adjunct which distinguishes it from the nom. : thus we do not find *terrā* alone, but *terra marique*, so not *ripā*, but *ripa frequenti*, An. iii. 9,—and the strange employment of 'urbes' (= 'oppida,' 'municipia') before 'urbs' (= 'Roma') by a writer so studious of variety of expression as Tacitus, have led Heraeus, following Wölflin (who has given an exhaustive discussion of the passage in *Philologus*, xxvii., pp. 121 ff.), to bracket 'urbes,' and to write '*hausta aut obruta fecundissima Campaniae ora*'—an expression which admirably describes the catastrophe ('hausta' indicating the action of the sea, and 'obruta' that of the lava stream and ashes), and harmonizes with the language of Pliny, in his well-known letter to Tacitus on his uncle's death, '*pulcherrimarum clades terrarum*,' as well as with the allusion of Tacitus himself, An. iv. 67, '*pulcherrimus sinus, antequam Vesuvius mons ardescens faciem loci verteret.*' It has, too, been shrewdly observed by Müller, that if Tacitus were speaking of the ruin of cities, '*fecundissima ora*' would have little point, as the destruction of a city in a desert would be equally disastrous. C. & B. have adroitly

avoided the repetition of 'urbs'—'cities in Campania's richest plains were swallowed up. . . . Rome was wasted.' Translate, adopting Wölflin's emendation, 'the richest region of Campania was swallowed up or buried.'

(2). *Interiorem potentiam.*

'More confidential authority.'—C. & B. Tr.: 'influence in the palace.'

(3). *Cum agerent verterent cuncta.*

'Robbed and ruined in every direction.'—C. & B. Rather, 'carried everywhere their destructive activity,' 'cuncta agere' indicating the restless activity of the informers, which embraced everything within its sphere, 'vertere' (= 'evertere') its destructive consequences.

3. (1). *Supremae clarorum virorum necessitates; ipsa necessitas fortiter tolerata, et laudatis antiquorum mortibus pares exitus.*

This can scarcely be right. Nipperdey has got rid of the difficulty by bracketing 'ipsa necessitas,' and C. & B. have evaded it, translating 'illustrious men driven to the last necessity, and enduring it with fortitude.' I prefer to adopt Heraeus' easy emendation, 'necessitates, ipsae necesse fortiter toleratae.' The climax 'necessitates, necesse' is quite in Tacitus' manner, and for the accumulation of synonyms, 'neces, mortibus, exitus,' cf. the similar passage, 'etiam si bella,' etc., A. xvi. 16. In illustration of 'suprema necessitas' as an euphemism for the extremity from which the only escape is death, cf. c. 72. The plurals point to variety of times and persons (cf. *cotidianae necesse interitusque*, Cic. T. D. iii. § 65). Tr.: 'the last extremities, death itself, endured with fortitude by illustrious men.' If the common reading be retained, the play of words might be taken off—'the last hours, the hour of doom itself.'

(2). Nec enim umquam atrocioribus p. R. cladibus magisve justis indiciis adprobatum est non esse curae deis securitatem nostram, esse ultionem.

‘Never surely did more terrible calamities of the Roman people, or evidence more conclusive, prove that the gods take no thought for our happiness, but only for our punishment.’—C. & B.

This translation, perhaps properly, does not note the play of words, ‘curae . . . securitatem’—‘the gods *care* not that our life should be *free from care*, but for our chastisement.’

Meiser’s proposal, ‘vindictis’ for ‘indiciis’ is tempting, based as it is on Lucan’s lines, which may have been present to Tacitus, ‘felix Roma quidem civesque habitura beatos, | si libertatis superis tam cura placeret, | quam vindicta placet,’ iv. 807 ff. It has been urged that ‘indiciis’ belongs to a different sphere of thought from ‘cladibus,’ and ‘vindicta’ is certainly used by Tacitus, An. vi. 32; but the objection is, it seems to me, modern, and I find no trace of the plural ‘vindictae.’

4. (1). Imperii arcanum.

‘Secret of the empire.’—C. & B. This translation may stand, though somewhat ambiguous, ‘empire’ standing for the ‘imperial dignity’ in the obj. gen., *i.e.*, ‘regarding the empire.’ Louandre has mistranslated—‘un grand secret d’État,’ confounding the expression with ‘arcana imperii,’ An. ii. 36, ‘mysteries of government.’ So also Messrs. C. & B., in their preface, ‘the *secret of empire*, that Emperors, etc,’ (p. vi.)

(2). Pars populi integra.

‘The *respectable* part of the people.’—C. & B. Literally, ‘sound,’ *i.e.*, in respect of fortune and reputation, opposed to ‘*adesis bonis*,’ as well as ‘*sordida*.’

6. (1). Invalidum senem.

‘The weak old Emperor.’—C. & B. Tr.: ‘feeble.’ ‘Invalidus refers not to moral but to physical weakness. Cf. cc. 9, 31, 88.

(2). Inauditi atque indefensi tamquam innocentes perierant.’

‘They had perished without hearing or defence, like innocent men.’ Tr.: ‘dying without hearing or defence, they were regarded as innocent.’

7. (1). Sed a legatis bellum suadentibus, postquam impellere nequiverint, crimen ac dolum ultro compositum.

‘That this was a treacherous accusation invented by the commanders themselves, who had urged him to take up arms, when they found themselves unable to prevail.’—C. & B. Tr.: ‘but that his lieutenants, having tried to excite him to war, and failed in the attempt, had actually concocted an accusation and plot against himself.’

The word ‘ultro,’ in addition to its ordinary meaning of ‘contrary to what we have reason to expect,’ has here the secondary sense which it so often bears of ‘taking the initiative,’ ‘passing from defence to aggression’ (= ‘to be beforehand with.’) In fact, the sentence might be paraphrased ‘the lieutenants forestalled the accusation of their chief by impeaching himself.’ Cf. Liv. i. 5, ‘captum regi tradidisse ultro accusantes.’ ‘Ultro’ is inadequately rendered in the translation, while the word ‘legatus’ is strangely translated ‘commander.’ The parallel passage, c. 58, ‘tamquam crimen ac mox insidias Fonteio Capitoni struxisset,’ makes it improbable that ‘crimen ac dolum’ is a *ἐν διὰ δύοιν* (*vid. Dräger, Hist. Synt.* § 311, 9).

(2). An ne altius scrutaretur, quoquo modo acta, quia mutari non poterant comprobasse [sc. Galbam].

‘Or to avoid investigation into the circumstances of

acts which could not be altered [he sanctioned the deed].'
—C. & B. Tr.: 'or, *perhaps*, to avoid further inquiry, had sanctioned acts which, *whatever their character*, could not be undone; lit. 'acts of whatever character, *because*,' etc. 'An,' with the omission of a word expressing doubt—('incertum an').

(3). Servorum manus subitis avidae.

'The slaves caught with greedy hands *at immediate gain*.'—C. & B. Tr.: '*in their sudden change of fortune* were grasping.' Cf. 'mutabile subitis,' c. 69.

8. (1). Et metu, tamquam alias partes fovissent.

'They feared *because they might seem* to have supported *an unsuccessful party*.'—C. & B. This translation misses the point of 'alias' (*other* than the party of Galba), and suggests doubt (not implied in the original) of the support given to Verginius by the army of Germany. Heraeus has well illustrated the sense of the passage, and incidentally explained one of the most noticeable of the peculiarities of Tacitus' diction—his occasional use of 'tamquam.' That use is, like most of the peculiarities of later Latin, based on a Greek construction—the expression, namely, by *ὡς* with a participle, of the ground of an action, *in subjective form*, but without any intimation that the notion does not correspond to reality, or that it rests upon illusion. In Latin the missing participles of the aorist and perf. part. are supplied by the subjunctive, and 'tamquam' in this combination may be variously rendered by 'in the idea,' 'under the supposition,' 'with the allegation that,' by 'as' with the participle, or by a causal or relative clause with the addition 'in his (their) opinion.' Cf. c. 52: 'infensus Galbae, *tamquam* detectam a se Verginii cunctationem ingratis tulisset' ('*conceiving that* he had not duly acknowledged his exposure of Verginius' hesitation'); c. 80:

'fremit miles . . . *tamquam* familiae senatorum *armarentur*' ('*alleging that* the slaves of senators were receiving arms'). Here we may render, 'were apprehensive, as (in the consciousness of) having warmly espoused ('fovisent') another cause'; or we may regard the phrase as doubly subjective, indicating at once the feelings of Galba's party, and the consciousness of those feelings in the minds of the German army, so that the full meaning will be, '*in the consciousness of being regarded* as the adherents of another party.' Quite analogous is the use of '*tamquam*' with the per. part. dep. (cf. '*tamquam furatus*,' c. 48), and with the fut. part. (cf. '*tamquam invasurus*,' An. vi. 36).

(2). An imperare nolisset dubium.

'It was doubtful whether he had wished.'—C. & B. Ritter and Orelli read '*voluisset*.' Halm and Heraeus, following the Medicean MS., *nolisset*. Tacitus' usage varies in such cases; sometimes he follows the older classic writers in making '*haud scio*,' '*nescio*,' '*dubito an*,' &c., express an inclination to belief, as iv. 63, '*an coloniam A. diripiendam permitterent, dubitavere*,' An. xiii. 50, '*dubitavit Nero, an vectigalia omitti iuberet*,' sometimes, with later writers, he makes them express simple suspense between two possibilities, cf. c. 23, '*incertum an repens*'; An. i. 5, '*dubium an quaesita morte*.'

9. (1). Infirmirate retinentis ultro accendebantur.

'They were irritated by the *very* feebleness of his restraint.'—C. & B. Tr.: 'they were *even* irritated' (v. c. 7).

(2). Doctae hostem potius odisse.

'Taught to concentrate their hatred on the enemy.'—C. & B. More strictly, 'rather to hate the enemy,' *i.e.*, '*quam cives*,' understood from '*civilium* bellorum motus'

in the context. For a similar use of 'potius,' cf. iii. 10, 'hostium potius exercitibus illum furorem inicerent, orabat.' Cf. also Hor. Od. i. 2, 21, 'audiet cives acuisse ferrum, quo graves Persae *melius* perirent.'

10. (1). Insignes amicitias ambitiose coluerat.

'He had cultivated *with many intrigues* the friendship of the great.'—C. & B. Rather, 'with a view to his advancement,' cf. c. 15, 'sed neque ipse imperium ambitione accepi'; or perhaps 'earnestly,' cf. 'precibus ambitiosis,' ii. 4, 9; or 'from vanity,' cf. Agr. 42, 'ambitiosa morte.' The first explanation, which follows the proper meaning of 'amb.,' is to be preferred. 'Ambitiosus,' it may be observed, is not co-extensive with 'ambitious,' having special reference to the Roman 'honor.' Its distinctive meaning is well brought out in Cic. Tusc. Dis. v. § 79, 'omitto quae perferant ambitiosi honoris causa, laudis studiosi gloriae gratia, amore incensi cupiditatis' (v. Seyffert Laelius, 373).

(2). Ad venerationem cultumque eius.

'To acknowledge his authority and to bespeak his favour.' Tr.: 'to do him homage and to express devotion.'

(3). Occulta fati . . . post fortunam credidimus.

'As for the hidden decrees of fate, . . . we believed in them only after his success.—C. & B. Tr.: '*Our belief* in a secret disposal of destiny *we have gained* ('credidimus') since *their elevation*.' Dräger and Heraeus have pointed out the remarkable development of the substantival use of the neut. plur., nom. and accus., of the adjective in Tacitus. In Cicero and Caesar it is only found in connexion with the partitive gen., in phrases, *e.g.*, like 'interiora aedium,' 'inania nobilitatis,' and the like; while in Tacitus this restriction is forgotten, and we have the free use of combinations like 'occulta fati'; 'incerta noctis,' c. 26, formed

upon Greek analogies, such as τὰ λαμπρὰ τῆς τυχεῖς. Cf. too 'inculta montium,' An. i. 17; 'subiecta vallium,' c. 65, in which there is as little trace of the partitive notion as in Vergil's 'strata viarum' (see Dräger, § 198, 4).

11. (1). Loco regum.

'As kings.—C. & B. Tr.: 'in the room of their kings.' Cf. 'loco libertatis,' c. 16; 'scimus consules in locum regum successisse,' Liv. iv. 3.

(2). Domui retinere.

'To keep *under home control*.'—C. & B. Tr.: 'to reserve to the (Imperial) house,' *i.e.*, instead of giving it a proconsular administration. Heraeus cites 'seposuit Aegyptum,' An. ii. 59; and 'sibi seposuit,' vi. 19; and for 'domus' used for 'domus principis,' cf. 'in domo,' c. 15.

12. Etiam in T. Vinii odium, qui in dies quanto potentior, eodem actu inuisior erat.

'They were also moved by hatred of T. Vinus, who grew daily more powerful, and in the same proportion more unpopular.'—C. & B. Tr.: 'Also *to gratify* their hatred ('in' final, cf. 'in unius sollicitudinem,' c. 89) against T. Vinus, who daily with each *advance* in influence became more odious.' For the primary meaning of 'actus' H. aptly cites Verg. Aen. xii. 687, 'fertur in abruptum magno mons improbus actu;' lit. 'with every *impulse* (toward a higher position).'

13. (1). Credo et reipublicae curam subisse.

'I believe also that he had at heart some care of the republic.'—C. & B. A poetic use. Cf. Verg. Aen. ii. 560 (cited by H.), 'subiit cari genitoris amici.' Tr.: 'perhaps too there rose up the thought of the republic.' Cf. c. 37,

where 'animum' is added. It is remarkable how the diction of Tacitus is tinged with reminiscences of Vergil.

(2). Prona in eum aula Neronis ut similem.

'And the court was biased in his favour *because he resembled Nero.*' Tr.: '*Nero's court* inclined to him as a *kindred spirit.*'

14. Ea pars morum eius.

'This *point* in his character.'—C. & B. Tr.: 'this *side* of his character.'

15. (1). Non quia propinquos aut socios belli non habeam, sed neque ipse imperium ambitione accepi, et iudicii mei documentum sit non meae tantum necessitudines quas tibi postposui, sed et tuae.'

'Not because I have no relatives or companions of my campaigns, but *because* it was not by any *private favour* that I myself received the imperial power. Let the principle of my choice be shown not only *by my connexions* which I have set aside for you, but by your own.'—C. & B. Something perhaps is gained in neatness by the deviation from the original, but the connexion is sacrificed by the neglect of 'neque—et,' and the displacement of 'ambitione' (not 'personal favour,' but 'the desire of personal advancement,' 'ambitio *honoris*,' v. c. 10, § 1), and there is much rhetorical force in the abruptness which states the true cause in an independent sentence. (For this construction see Heine on Cic. Tusc. Disp. i. 1, 'non quia philosophia, sed meum iudicium,' etc.) Tr.: 'but I did not myself accept the empire from ambition, and, in evidence of the motive of my choice, let me point to the connexions, not only mine but yours, to which I have preferred you;' *i.e.*, 'I did not accept the government from personal aims, and I have

equally disregarded personal considerations in the choice of a successor.' The use of the singular 'sit' is justified not only by the usage which makes the copula agree with a preceding predicate, but also by the circumstance, that the logical subject is not 'necessitudines,' but 'quod meas necessitates tibi postposui.' C. & B. follow the Latin idiom.

(2). Acrioribus stimulis.

'With keener temptation.'—C. & B. Tr.: 'with keener probe.'

(3). Irrumpet adulatio blanditiae, pessimum veri adfectus venenum, sua cuique utilitas.

C. & B. connect 'pess. ver. adf. ven.' with what goes before, Heraeus with what follows, showing by numerous examples that it is Tacitus' manner thus to prefix an apposition, or explanatory clause, in cases of asyndeton and polysyndeton. If his suggestion be accepted, and I have little doubt that it is right, it will be better to insert 'et' after 'blanditiae,' as is usual when an asyndeton of three members is interrupted by a parenthesis. Cf. c. 51, *fin.*, 'odio metu et, ubi vires suas respexerant, securitate.' It may be further observed, that 'adulatio' and 'blanditiae' are not identical in meaning. 'Adulatio' (Gr. *κολακεία*) is that flattery which degrades itself ('adulationi foedum crimen servitutis inest,' c. i. 1, 4), for some selfish aim; cf. Theoph. c. iii., *τὴν κολακείαν—ὁμιλίαν αἰσχροῦ, συμφέρουσαν δὲ τῷ κολακεύοντι*. 'Blanditia' (Gr. *ἀρέσκεια*), on the other hand, revels in pleasing in and for itself. A *locus classicus* on the subject is Cic. de Pet. Cons. § 41. Cf. Arist. Eth. iv. 12, *ὁ τοῦ ἡδὺς εἶναι στοχαζόμενος μὴ δι' ἄλλο τι (ἄρεσκος)* (see Seyffert, Lael. 518 fg.) Tr.: 'Adulation will force itself upon you, the courtier's arts, and that worst bane of true affection, self-interest.'

18 (1). *Observatum id antiquitus comitiis dirimendis.*

'Though *this* had from ancient time been made a reason for dissolving an assembly.'—C. & B. Tr.: 'though the *observation* of this (phenomenon), etc.,' the technical *observatio*.'

(2). *Tamquam perdidissent.*

'Who seemed to think that they had lost.'—C. & B. Tr.: 'when they considered that they had lost'—'as having lost.' See c. 8, § 1.

19. *Pisonis comis oratio, et patrum favor aderat; multi voluntate, effusius qui noluerant, medii ac plurimi obvio obsequio.*

C. & B. have, in this passage, strangely retained the barbarous '*medie*,' and adhered to the old punctuation, translating, 'Piso delivered a graceful oration, and was supported by the feeling of the Senate. Many who wished him well spoke with enthusiasm, those who had opposed him in moderate terms; the majority met him with an officious homage, etc.' Translate, changing '*medie*' into '*medii*,' and adopting the above punctuation: 'Piso's speech was gracious, and was favourably received by the senate. Many applauded ('*favebant*' from '*patrum favor aderat*') from good will; those who had been adverse to him with extravagance (to efface their former opposition); while the indifferent, who formed the great majority, met him with a ready submissiveness, etc.' For the meaning of '*medii*,' cf. '*mediis patrum adnitentibus retinere morem*,' iv. 8; and for the combination '*medii ac plurimi*,' cf. '*vulgus et ceteros*,' c. 25; '*vulgus et plures*,' c. 83. For the meaning of '*obvio*,' cf. *An. ii. 2*, '*obvia comitas*.'

20. (1). *Bis et viciens miliens sestertium.*

'£17,625,000.'—C. & B. More accurately, '£17,187,500.'

(2). Novum officii genus et ambitu et numero onerosum.

‘A novel office, and burdensome by the number and intriguing practices of *those with whom it had to deal*.’—C. & B. There has been much controversy as to the reference of ‘ambitus’ and ‘numerus,’ but that this is not the meaning of the sentence is, I think, plain from the succeeding words, ‘ac tamen grande gaudium,’ which show that the burden was not on the *commissioners*, but on the *people*. Tr.: ‘a novel office and burdensome from the number and the intrigues (of the commissioners)’; or simply, ‘an extraordinary commission, burdensome from its numbers and its malpractices.’ The number of the commissioners enabled them to be everywhere at the same time (‘ubique hasta, etc.’), and we can conceive many openings for ‘corrupt practices,’ as, for instance, the securing for oneself the liquidation of a particular estate, trafficking with those affected, etc. In the next clause C. & B. have adopted the inferior reading, ‘auctionibus’ (auctions), instead of ‘actionibus’ (legal proceedings), the reading of the Medicean MS. adopted by recent editors.

(3). Grande gaudium, quod tam pauperes forent, quibus donasset Nero, quam quibus abstulisset.

‘That the men whom Nero had enriched *would be* as poor, etc.’ Tr.: ‘that the men *were* (‘forent,’ not the potential, but the subjunctive of reported reason) as poor,’ etc. It may be observed that ‘forent,’ which in Cicero is only found in hypothetical sentences, is in Tacitus used indiscriminately with ‘essent.’ Cf. c. 49, ‘si mali forent’ (‘when they were bad’), where ‘si forent’ answers to the Greek *ei* with the optative, denoting repetition in past time.

21. (1). Fingebat et metum, quo magis concupisceret.

‘He even *pretended to fear* to make himself keener in

desire.'—C. & B. Not so: acting a part does not quicken the feelings. Tr.: 'He *conjured up fears* to whet his desires'—a stroke worthy of Tacitus.

(2). [Occidi Othonem posse].

'How easy to put Otho to death.'—C. & B. These words, in which Otho speaks of himself in the third person, have been bracketed by Ulrichs and Ritter, and, as Heraeus points out, are rendered more suspicious by the Tacitean usage of putting 'posse' first in such phrases: cf. 'potuisse conciliari animos,' c. 18; 'posse Blaesum perverti,' iii. 38. But see ii. 47, 'hinc Othonem posteritas aestimet.'

22. (1). Adulteria, matrimonia.

This is the reading of the Med. MS., and I see no reason for change; on the contrary, the asyndeton is full of force. Ritter and Ulrichs regard 'matrimonia' as a gloss to 'adulteria.' C. & B. translate, I suppose, Lipsius' conjecture, 'adultera matrimonia'—a reading also accepted by Heraeus, which I cannot think to be right—'light marriages.' If this conjecture be adopted, and the poetic word 'adultera' admitted, the meaning will be 'matrimonia ex adulterio orta': cf. An. xiii. 45, 'nec mora, quin adulterio matrimonium iungeretur.'

(2). Pessimum principalis matrimonii instrumentum.

'The vile *tools* of the Imperial household.'—C. & B. Rather, 'appointments,' 'furniture.' Cf. Cic. in Ver. iv. § 97, 'in instrumento ac supellectile Verris': 'détestable ameublement d' un ménage impérial' (Burnouf).

(3). Coniectura iam et rumore senium Galbae et iuventam Othonis computantium.

'And arguing from *his own* conjectures and the common talk of *those who compared* Galba's age with Otho's youth.'—

C. & B. 'Coniectura' is not to be thus separated from 'computantium' (Louandre and Roth concur in connecting the words), and the rendering of the latter, which here supplies the place of an attributive to 'coniectura et rumore,' is unidiomatic. Tr.: 'he had *now* (with reference to 'postquam'), from the *speculation and common talk which took account* of Galba's age and the youth of Otho, etc.'

The translation of the gen. plur. of the present participle requires much nicety in Tacitus. Here, as we have seen, and in the parallel expressions 'rumoribus nihil silentio transmittentium' ('rumour that allows nothing to pass in silence'), c. 13; 'segnitia terentium tempus' ('the want of energy that lets the time slip by'), c. 33, it is translated by an attributive participle; elsewhere, as in 'primo gaudentium impetu' ('in the first outburst of joy'), c. 4; 'consensu errantium' ('agreement in error'), c. 35, by an abstract noun. This arises from the circumstance, that Latin is much more chary of attributing action to abstractions than modern language. The subject of the sparing use of abstract nouns in Latin is discussed with great fulness and interest by Nägelsbach, *Lat. Stil.* See particularly §§ 28-30.

23. Neroniani comitatus.

'The progresses of Nero.'—C. & B. Tr.: 'Nero's escort.'

24. Ut per speciem convivii . . . cohorti excubias agenti viritim centenos nummos divideret; quam velut publicam largitionem, etc.

'(He gradually went so far) as to distribute . . . one hundred sesterces to each soldier of the cohort on duty, under pretext of treating them. This which we may almost call a public bounty, etc.'—C. & B. In illustration of this passage, Heraeus refers to the statement of Suetonius, that Nero, in his public banquets, substituted the

'sportula' for actual entertainment ('publicae cenae ad sportulas redactae'). Otho, in adopting the Imperial practice with the guards, gave to their entertainment an official aspect ('publica largitio'), and at the same time, under cover of the sportula ('per speciem convivii'), which he raised from the customary 25 to 100 sesterces, he bestowed on them a substantial bribe. Tr.: 'distributed, under guise of entertainment, one hundred sesterces to each man: this semi-official bounty, etc.'

25. (1). Onomastum futuro sceleri praefecit, a quo Barbium Proculum . . . et Veturium perductos, postquam—callidos audacesque cognovit, pretio et promissis onerat, etc.

'Onomastus, *who brought over to his views* Barbium Proculus, etc.'—C. & B. This is of course wrong: 'perducere' is not used in the sense of 'ad sententiam suam perducere.' Tr.: 'brought into *Otho's presence*.' The word forms a natural introduction to 'cognovit' and 'onerat,' which have 'Otho' for their subject.

(2). Suscepere——transtulerunt.

Heraeus calls attention to a nicety of expression in this celebrated sentence. 'Tacitus,' he says, 'prefers the form in *ēre* for the aor., that in *ērunt* for the perf.'

(3). Mutandae militiae.

'Of having to serve *elsewhere*.'—C. & B. Tr.: 'in another (a lower) branch of the service.' For the significance of this species of degradation ('mutatio militiae'), see Marquardt, Röm. Staats. ii. 552. We find the opposite of the expression in c. 87, 'facta spe honoratoris in posterum militiae.'

26. (1). Adeoque parata . . . etiam apud integros dissimulatio fuit.

'And so *close the secrecy* preserved by the loyal.'—C. &

B. This is not the meaning of 'dissimulatio.' Tr.: 'so ready the connivance of the innocent.' Cf. 'primos Civilis conatus per dissimulationem aluit,' iv. 18; and for the corresponding meaning of 'dissimulare' (= 'to ignore,' 'affect ignorance of'), 'dissimulatus Macri [consulatus],' ii. 71; 'cum non silentio consulum dissimularentur,' Cic. pro Sest. § 35.

(2). Postero iduum dierum.

'The 14th of Ian.'—C. & B. This is the reading of the Med., which Orelli corrects by the omission of 'dierum.' Wölflin, followed by Heraeus, corrects 'postero id. Ian. die,'—supposing the corruption to have arisen, through assimilation to the preceding gen., from 'die re' standing at the end of the line,—and inserts the indispensable name of the month. The corrected reading he interprets—on the authority of Mommsen on Cic. p. Sul. § 52, 'posterum diem nonarum Novembrium'—'postero die, qui dies fuit Id. Ian.,' i.e., the 13th. This leaves a day's interval, before the catastrophe, for the events at the end of the chapter.

(3). Militum castra.

'The troops.' Tr.: 'the quarters of the troops.' As to the distribution of these quarters, v. c. 31.

(4). Inter temulentos.

'Among a half-intoxicated crowd.'—C. & B. Tr.: 'in a drunken crowd' (i.e., 'cum temulenti essent'). For the use of 'inter,' v. c. 1.

(5). Elusit.

'Mocked.'—C. & B. Rather, 'lightly turned aside,' from the primitive meaning of 'eludere' (= 'to parry'). Cf. 'eludens respondet,' An. ii. 79; also, 'neque refellere aut eludere dabatur,' iii. 67.

27. (1). Hostem.

'An enemy.'—C. & B. Tr.: 'a traitor.'

(2). Pars clamore et gaudiis.

C. & B. have here followed the manifestly corrupt reading, 'gladiis,' translating, 'some shouted and brandished their swords.' It is scarcely worth while to discuss this exploded reading, but I may briefly point to the 'strictis mucronibus' of the preceding clause, to the incongruity of the combination 'clamore et gladiis,' and to the fact that the obvious emendation 'gaudiis' gives us a favourite *ἐν δὲ δυνάμει* of Tacitus. Cf. ii. 70, 'clamore et gaudio;' 'gaudiis clamoribusque,' iv. 49; and the very similar 'gaudio et impetu,' An. iii. 74. The subject of this trope, so frequent in Tacitus, has been discussed with great minuteness by Dräger, *Hist. Synt.* § 311, 9. In its strict form it consists of the co-ordination of two (usually abstract) substantives, one of which is logically subordinate to the other. It is often difficult to determine which of the combined notions is the fundamental one, and the order in which they are presented is by no means fixed, but we may perhaps lay it down as a rule (not, however, without exceptions, e.g., 'famam et posteros,' An. xi. 6) that, in Tacitus, the more general notion is placed nearer to the predicate. Applying this rule to the phrase in the text, we may translate 'clamore et gaudiis' 'loud expressions of joy;' 'gaudio clamoribusque' (iv. 49) 'joyful acclamations.' There are many cases of *apparent ἐν δὲ δυνάμει*, which it is difficult to distinguish from the true; in general, however, the application of the definition will supply a sufficient test.

29. Non quia meo nomine tristiozem casum paveam . . . ; patris et senatus . . . vicem doleo, etc.

'It is not that I dread on my own account the gloomier

issue. It is the lot of my father, of the Senate . . . that I deplore.'—C. & B. The common error that makes 'vicem' the object of 'doleo' mars the symmetry of the period. The adverbial phrase 'patris vicem' ('on account of my father,' cf. Liv. i. 25, 'exanimes vicem unius,' and see Madvig, 237 c, Obs. 3) balances 'meo nomine;' and the construction is that of 'non quia propinquos—sed neque accepi,' c. 15—that, namely, in which the true cause is stated in an independent proposition with the indic. Tr.: 'not that I fear a disastrous issue on my own account . . . ; it is for my father that I grieve.'

30. (1). Cum amicum imperatoris ageret.

'When he was but the Emperor's friend.'—C. & B. Not so. Tr.: 'when he played the part of friend to the Emperor (Nero).' More tersely, 'enacted the Emperor's friend.' What, now that he is a declared enemy?

(2). Habitune et incessu an illo muliebri ornatu mereretur imperium?

'Shall he earn the Empire now by his manner or gait?'—C. & B. 'Mereretur' is the deliberative conjunctive of *the past*. For the intensive force of 'ne,' see Madvig, 451 a. Tr.: 'Should he, by his bearing and gait (exhibited in the last reign, symbols of the 'vitia' which have just *overturned* a throne), have earned a throne'?

(3). Bonis artibus exercuit.

'Exercised for good ends.'—C. & B. Tr.: 'made a virtuous use of.'

(4). Si res publica et senatus . . . vacua nomina *sunt*.

'*Were* the Senate, the Country . . . but empty names.'—C. & B. Tr.: 'if the Commonwealth and the Senate *are*, etc.'

31. (1). Cetera cohors . . . forte magis et nullo adhuc consilio rapit signa *quam*, quod (par signas quod, *Med.*) postea creditum est, insidiis et simulatione.

'The rest of the cohort . . . displayed (? parat) their standards, acting on mere impulse, and without any settled plan.'—C. & B. We need have no hesitation in preferring, with recent editors, the apt and vivid 'rapit' to the unmeaning 'parat' of the vulgate. Cf. 'rapta arma,' c. 38; 'correptis signis,' ii. 18; 'sublatis raptim signis,' Liv. xxii. 6. 'Quam' has fallen out, as elsewhere, before the relative. Tr.: 'instinctively, and while yet they had no fixed plan, the rest of the cohort seized their standards.'

(2). Quia non ordine militiae, sed e Galbae amicis, fidus principi suo et desciscentibus suspectior erat.

'It was not his rank as an officer, but his friendship with Galba, that bound him to that Prince, and roused a stronger suspicion in the mutineers.'—C. & B. The translators neglect 'quia,' and otherwise miss the point. There was no need of saying that it was not Longinus' military rank that increased the suspicion against him. J. Müller (cited by Heraeus) first correctly analysed this somewhat difficult sentence: 'e Galbae amicis' (= 'Galbae amicus') is co-ordinated with 'ordine militiae,' and both belong to 'fidus p. s. (sc. erat),' 'et' introducing the statement of a consequence. Tr.: '(Longinus they—disarmed) because he was true to Galba as his friend, and not on account of his rank in the service, and thus was more distrusted (*i.e.* than Subrius and Cetrius),' more freely, 'because, being true to G. on the score of friendship, and not from his military rank, he was the object of graver suspicion.'

(3). Infestis pilis.

'With a shower of javelins.'—C. & B., translating 'ingestis.' Read 'infestis' = 'levelled.' Cf. iii. 85.

(4). *Germanica vexilla.*

'The German *veterans*.'—C. & B. Tr.: 'the detachments from the army of Germany.' The meaning of the word 'vexillum' is in itself quite vague, and this has given rise to the greatest confusion in its interpretation. It may therefore be worth while to state concisely its several uses. Besides its primary meaning of 'a standard,' and occasionally 'the company' which bears the standard (see c. 36, 1), the word has two main significations: (1). Any *detachment* from any branch of the service, placed for special duty under a distinct command, had its own 'vexillum,' and is named 'vexillum,' or 'vexillatio,' so that we cannot know the significance of the word in any particular place, unless it be associated with the name of the corps to which the detachment belongs, or we can ascertain this from the context. Thus we read of 'vexilla,' from single legions, as 'tertiae decimae legionis vexillum,' ii. 34; of combined 'vexilla' from several legions, as here, 'Germanica vexilla,' *i.e.*, the detachments drawn by Nero from the army of Lower Germany for the war in the East (c. 6)—'the inferioris exercitus electi' of c. 61; of 'vexilla' of the *auxiliary* forces, as in c. 70, where the 'Germanorum vexilla' are opposed to the legionary troops; and again, quite generally, of 'vexilla equitum,' ii. 11; 'vexilla tironum,' An. ii. 78. (2). The name stands for '*veterans*,' who, having served twenty years, were, after their discharge, attached to some corps with special privileges. To be sure that the word bears this meaning, we must have the full designation, 'vexilla veteranorum,' or the reference must be manifest from the context. Our translators apply this special meaning of the word quite indiscriminately. It may be worth noting, that the original meaning of the word 'vexillarius' is that found in c. 41 *in*. = 'standard-bearer': the meaning 'belonging to a vexillum' came in in Imperial times. (See Marquardt, Röm. Staats. ii. 450 fg.).

32. (1). *Licentia adclamationum et studiis inanibus.*

‘With reckless applause and meaningless zeal.’—C. & B. Tr.: ‘With extravagant acclamations and mock enthusiasm.’ Note the deviation from the older use of ‘adclamatio’ (= ‘expression of disapproval,’ ‘clamour’). The word is used especially to express the greetings which hailed the accession of an Emperor.

(2). *Eundi ultro.*

‘Of going out.’ Tr.: ‘of going to meet the peril,’ *vid.*

c. 7.

33. (1). [*Othonem*] qui furtim digressus, ad ignaros inlatus cunctatione nunc et segnitia terentium tempus imitari principem discat.

‘Otho, who stole away to be introduced to a few strangers, but who now, thanks to the hesitation and inaction in which we waste our time, is learning to play the prince.’—C. & B. Tr.: ‘Otho, who stole away (from the temple), and having introduced himself to men who knew nothing of his designs (personally Otho was well known to the praetorians, his ‘commilitones,’ v. c. 24), is now, thanks to our hesitation . . ., learning to play the prince.’ ‘Inlatus’ reflective (cf. ‘translatus,’ c. 53), perhaps connoting *intrusion* (cf. Cic. Caec. 5).

(2). *Ianua ac limine tenus domum cludit.*

‘Barricades the doors of his palace.’—C. & B. The Latin phrase, ‘bars his palace to the threshold,’ is a compressed expression for ‘bars his palace, so that he may not pass the threshold.’ We might render, ‘just ventures to the door to bar his palace.’ Cf. Ascon. in Mil., quoted by Forcellini, ‘domi tenus obsessus est,’ and our own phrase, ‘confined to his house.’ The employment of ‘cludit’ in oblique narrative, for the sake of vividness, should be noted by young students, as one of Tacitus’ numerous Graecisms.

(3). Obsidionem nimirum toleraturus.

These words surely heighten the irony of what goes before—‘Our noble Emperor, with his gallant friends, is barring the palace, no doubt to stand a siege.’ C. & B., reading ‘toleraturus,’ join them with what comes after.

(4). Proinde intuta quae indecora.

‘Moreover, that cannot be safe which is not honourable.’—C. & B. ‘Proinde’ does not mean ‘moreover.’ If retained, it is the hortative ‘then.’ Nipperdey, however, followed by Heraeus, reads ‘perinde,’ paraphrasing ‘ut quidque intutum ita indecorum esse,’ *i.e.*, ‘what is dishonourable is unsafe as well.’ For the meaning of ‘perinde’ (‘equally’) see c. 31, *sub fin.*, where certainly it should be read for ‘proinde,’ which violates at once construction and sense. Here, however, I have no doubt the vulgate is right. The turn is exactly the same as ‘proinde agendum, etc.,’ c. 21.

34. (1). Speciosiora suadentibus.

‘More plausible advisers.’—C. & B. Tr.: ‘More specious counsels.’ See c. 22.

(2). Credula fama inter gaudentes et incuriosos.

‘Between the delight of some, and the indifference of others, the report was easily believed.’—C. & B. We have traced (c. 1) the source of the error which fancies an antithesis here (cf. ‘vagos et incuriosos,’ c. 79); and there is no reason for thinking that ‘credulus’ in this one passage is passive. If we give ‘fama’ the sense it bears in c. 14, ‘prospera de Pisone fama,’ in An. iv. 11, ‘atrociore semper fama erga dominantium exitus,’ and in Cic. Tusc. Disp. i. § 109, ‘quantum autem consuetudini famaеque dandum sit, etc.,’ *i.e.*, ‘public opinion,’ we may assign to ‘credula’ its ordinary meaning.

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Tr.: 'opinion was easy of belief in a delighted and thoughtless crowd;' perhaps = 'in the thoughtlessness of joy.'

35. (1). *Lingua feroces.*

'Fierce of speech.'—C. & B. Tr.: 'tongue-valiant.' As H. observes, the opposite of '*animi ferox*,' An. i. 32.

(2). *Donec . . . Galba inruenti turbæ neque ætate neque corpore sistens sella levaretur.*

'Till Galba . . . as from age and bodily weakness, he could not stand up against the crowd that was still rushing in, was elevated on a chair.'—C. & B. I cannot think that '*sistens*' can be construed with '*turbæ*.' We must either read '*resistens*,' or take, by a Graecism common in Tacitus, '*turbæ*' as the dat. of the agent after '*levaretur*,' and interpret '*sistere*' 'to keep his feet,' a sense for which Heraeus cites Verg. Aen. xi. 873; Cic. in Ver. ii. § 96. In the latter case translate, 'till Galba, as from age and weakness he could not keep his footing, was by the in-rushing crowd lifted on a chair.'

36. (1). *Ut non contenti agmine et corporibus in suggestu, in quo paulo ante aurea Galbæ statua fuerat, medium inter signa Othonem vexillis circumdarent.*

'That not content with surrounding Otho with their persons in close array, they elevated him to the *pedestal*, on which a short time before had stood the gilt statue of Galba, and there, amid the standards, encircled him with their colours.'—C. & B. It is inconceivable that our translators should have mistaken the '*suggestus*' (the 'platform' from which the general addressed his troops) for a '*pedestal*' of Galba's statue. The blunder gives a strangely ludicrous air to the succeeding scene. Lipsius has aptly illustrated the presence of Galba's statue on the '*suggestus*' from An. xv. 29, '*medio tribunal sedem curu-*

lem et sedes effigiem Neronis sustinebat.' The meaning of 'signa' and 'vexillis' in the next clause is far from obvious, and we receive little help from the translation. We cannot take 'vexilla' in its distinctive sense (as the flags of the cavalry or of the auxiliaries, in contradistinction to the standards of the legionary infantry, cf. 'signis vexillisque,' ii. 18; 'signa vexillaque,' ii. 43), and so careful a writer as Tacitus would hardly have used two terms to designate the same object in the same clause. It remains to take 'vexilla' in a sense in which it is often used, though not distinctively, as (1) the ensigns of the maniples, and (2) the maniples themselves. But then where is the opposition, which the sense requires, to 'agmine et corporibus'? This Heraeus finds in referring these words to 'the procession in which Otho was carried to the camp on the shoulders of the troops'—'succollatus,' as it is expressed by Suetonius, O. 6. The sense would then be: 'not satisfied with having borne Otho in procession on their shoulders, they set him on the platform, on which a little before had stood the gilded statue of Galba, and placing him among the standards, surrounded him with their companies.'

I cannot think this satisfactory. It is unreasonable thus to read Suetonius between the lines. The key to the difficulty, it seems to me, is found in a passage of the *Annals* (i. 34), which has been strangely overlooked by the commentators: 'adsistentem contionem, quia permixta videbatur, discedere in manipulos iubet: sic melius audituros responsum; vexilla praeferri, ut id saltem secerneret cohortes; tarde obtemperavere.' Germanicus, seeing the soldiers he was about to address in a promiscuous mass, desires them to fall into companies, and when they mutinously refuse, he orders the 'vexilla' (the three ensigns of the maniples of which the cohort consisted) to advance to the front, that the assembly might have at least cohort formation; and this

order is reluctantly obeyed. Now, without going minutely into the meaning of the last clause, we at once perceive a striking parallelism between this passage and the text. The praetorians do spontaneously what Germanicus sought to enforce. Not satisfied with surrounding Otho in a confused mass ('agmine et corporibus'), they wish to honour him by hearing his harangue in military order; and so they surround him with their maniples, headed by their ensigns. So much for the general sense, but what is the distinction between the 'signa' and the 'vexilla'? The former are, I think, the standards of the *cohorts*; the latter the banners of the *maniples*. Whether the *legionary* cohorts had distinct standards is a disputed point amongst antiquarians, but as to the *praetorian* cohorts there is no doubt (see Marquardt, R. S. ii. 425 (9)). What then we are told is this: that the praetorians placed Otho amongst the standards of the cohorts, and surrounded him with their 'vexilla,' which may indifferently be translated 'banners,' or 'companies.' I may add, that the explanation suggested is supported by the 'aquilis signisque' of the parallel passage, ii. 29, 'aquilae' designating the standards of the legions, 'signa' those of their divisions.

(2). Prensare manibus, complecti armis.

'They seized him, gave him the *military* embrace.'—C. & B. This is tempting from its neatness (cf. Louandre 'le baiser militaire'), but seems founded on a mistake. The Roman military salute was not an *embrace*, but an 'ave,' accompanied with a *lowering of arms*. Cf. Auct. bel. Afr. 85, 'armis demissis salutationem more militari faciunt.' The expression is evidently borrowed from Verg. A. xii. 432 f., 'postquam habilis lateri clipeus loricaque tergo est, Ascanium fuis circum complectitur armis;' but there, as here, a doubt has been raised, whether 'armis' belongs to 'armi' or 'arma.' Benoist, perhaps the most judicious of

Vergilian commentators, decides with Ladewig for the former. This view is, in the present passage, strongly supported by 'prensare *manibus*,' immediately preceding, by the form of the Roman military salute (*vid. supra*), and—what is perhaps decisive—by the statement 'rapta statim arma,' c. 38.

(3). Pro vallo.

'Before the rampart.'—C. & B. Tr.: 'from the front of,' a familiar use.

37. (1). Horror animum subit.

So Verg. Aen. x. 824, 'mentem patriae subiit pietatis imago,' cf. c. 13.

(2). Deditos—quos deprecantes in fidem acceperat.

'The prisoners, the suppliants, whom he had admitted to surrender.'—C. & B. Tr.: 'men who had surrendered, suppliants, whom he had admitted to his protection.' The pathos is heightened by the added clause.

(3). Et iam plus rapuit Icelus, quam quod Polycliti et Vatinii et †Tigellini petierunt.

'Petierunt' is Ritter's admirable emendation of the MS. reading 'perierunt.' The change is of the slightest, and we have a pointed antithesis to 'rapuit,' placed for emphasis before its subject. C. & B. have translated apparently 'paraverunt'—'have amassed.' 'Tigellini' is Gronovius' conjecture for the MS. 'aegialii.' C. & B. read 'Elii.'

38. Una cohors togata.

'One half-armed cohort.'—C. & B. Tr.: 'one cohort in the toga,' *i.e.*, in civilian's dress. The praetorian cohort on guard assumed the toga, laying aside, with the 'sagum,'

their 'arma' ('lorica, galea, clipeus'), and retaining only their side arms and lance.

40. (1). 'Completis basilicis et templis, lugubri prospectu.'

'The halls and temples were thronged with spectators of this mournful sight.'—C. & B. Strictly, 'were thronged and mournful was the prospect (they offered)'—lit. 'their outlook.'

(2). Quasi Vologesem aut Pacorum avito Arsacidarum solio depulsuri ac non imperatorem suum . . . trucidare pergerent.

'Like men who had to drive a Vologeses or Pacorus from the ancestral throne of the Arsacidae, not as though they were hastening to murder their . . . Emperor.'—C. & B. Tr: 'as though they were going to drive Vologeses or Pacorus from the ancient throne of the Arsacidae, and not hastening, etc.'

'Essent' is omitted after 'depulsuri.' Cf. c. 21, 'dum Galbae auctoritas fluxa, Pisonis nondum coaluisset.' This post-classical ellipsis of the subjunctive of 'esse' is, except in the case of exclamations and indirect questions, rarely admitted by Tacitus, unless a dependent subjunctive follows. (Wurzell, *de usu verb. subst. Tacit.* p. 50, quoted by Heraeus, c. 21).

41. (1). Vexillarius.

'The standard-bearer of the cohort.' Tr: 'a standard-bearer, etc.'—the bearer of one of the three 'vexilla' of the maniple, not the 'signifer' who carried the 'signum cohortis.' v. c. 36.

(2). Curtii lacum.

'The lake of Curtius.'—C. & B. Tr: 'basin.' See Rich, Dict.

(3). Trepidatione.

'Alarm.' Tr: 'nervous haste.'

(4). 'Agerent ac ferirent si ita e republica videretur.'

'Haste and strike.'—C. & B. It is perhaps impossible to render the full force of these words, in which 'agerent' represents the 'hoc age' of sacrifice, bespeaking the attention of the bystanders, and sanctioning the act. Suetonius supplies the omitted pronoun 'ut hoc agerent et ferirent,' G. 20. We might approximately convey the allusion—'smite the victim, if it seem for the public good.'

(5). Militem impresso gladio iugulum eius hausisse.

'A soldier completely severed his throat by treading his sword down upon it.'—C. & B. One is at a loss to think what suggested the grotesque and impossible conception of the translators. The metaphorical use of 'haurire' in the sense of 'perfodere' is frequent in the Latin poets (cf. Verg. Aen. ii. 600, 'inimicus et hauserit ensis,' and x. 314, 'latus haurit apertum'), and is found in the poetic prose of Livy, 'ventrem . . . hausit,' vii. 10. It is borrowed from the Homeric *διὰ δ' ἔντερα χαλκὸς ἤφυσεν*, Il. xiii. 508, and the origin of the metaphor is seen in the phrase *οἶνον διαφυσσόμενον* ('draining wine to the lees'), Od. xvi. 110. The transition was easy from the notion of 'draining' the *life-blood* to that of 'draining,' or, with less vivid perception of the metaphor, 'piercing' the *body*. In the text 'impresso gladio' is added to express the violence of the thrust.—Tr: 'a soldier pierced his throat with deadly thrust,' lit. 'pressing home his sword.'

42. Ante aedem divi Iulii iacuit primo ictu in poplitem, mox ab Iulio Caro . . . in utrumque latus transverberatus.

'He fell before the temple of the Divine Julius, and at the first blow, which struck him on the back of the knee;

immediately after Julius Carus ran him through the body.' —Tr: 'wounded in the first instance behind the knee, then run through the body by Julius Carus.' 'Primo' of course answers to 'mox,' and 'vulneratus' is to be supplied from (the Vergilian) 'transverberatus.'

43. (1). Contubernio.

'Chamber.'—C. & B. Tr.: 'abode,' 'cell.' The 'contubernium' (Hor. 'cella') is the abode of the temple slave ('aedituus') and his wife ('contubernalis'). Cf. 'disiecto aeditui contubernio,' iii. 74.

(2). Cum advenere missu Othonis nominatim in caedem eius ardentis, Salvius Florus, et Statius Murcus, etc.

C. & B. adopt the common reading 'ardentes.' I am disposed to accept Döderlein's emendation 'ardentis,' as bringing out the trait in Plutarch's narrative: οὐδέν ἐστι τοῦτο, ὧ στρατιῶται, (exclaims Otho when Galba's head is brought to him) τὴν Πείσωνός μοι κεφαλὴν δέιξατε.

44. (1). Omnesque conquiri et interfici iussit, non honori Galbae, sed tradito principibus more, munimentum ad praesens, in posterum ultionem.

'All these persons be ordered to be sought out and slain, not to honour Galba, but *to comply with* the traditional policy of rulers, *who thus provide* protection for the present and vengeance for the future.'—C. & B. A weak translation of the apposition which gives the ground of the recited action. Tr.: 'not to honour G., but following the traditional policy of princes, to secure the present, or to find an avenger in the future'; or—if we might venture to imitate the sententious chiasmus of the original—'as a bulwark for the present, for the future a revenge.' Such appositions to the sentence, usually in chiasmic order, are put in the accusative, if they follow a predicate involv-

ing action, cf. 'rem haud dubie utilem,' c. 46; when they contain a reflection upon the action or bearings of the subject, they are in the nominative, cf. 'laetum augurium,' c. 62. In Cicero, the use of appositions to the sentence is much more restricted than in Tacitus, being confined to reflections of the writer. They are sometimes in the nominative, cf. 'nec Homerum audio, qui Ganymedem ab dis raptum ait propter formam; *non iusta causa*, etc.,' Tusc. Disp. i. § 65; sometimes attracted to the case of some word in the preceding sentence, cf. 'rem non difficilem,' T. D. i. § 102, where see Heine.

45. Laudare militum iudicium.

'Praised *the wisdom* of the soldiers.' Tr.: 'the choice.'

46. (1). Vacationes.

'Fees for furloughs.'—C. & B. Not sufficiently wide; the full phrase is 'vacatio *munerum*,' An. c. 17, = 'militare otium' below. Cf. *infra*, 'aut *in ipsis castris vaga*.' Tr.: 'remission fees.'

(2). In Marcianum Icelum ut in libertum palam animadversum.

'M. I., being but a freedman, was publicly executed.'—C. & B. This does not fully convey the meaning. 'Libertinus' denotes a freedman in relation to the State, 'libertus' in relation to his patron; so that if simply the status of I. were indicated, he would be called 'libertinus.' With the growth of monarchical notions, however, it seems to have become customary to designate, in familiar language, the Imperial freedmen—in whose hands, before the change introduced by Vitellius (*vid.* c. 58), all the administration was concentrated, and whose full title was 'liberti Caesaris'—simply by the name 'liberti'; just as 'domus' was used absolutely for the Imperial house, cf. 'domui retinere,' c. 11; 'in domo,' c. 15. In this sense, then, we are

to understand 'libertus' whenever used alone in Tacitus. Icelus had been Galba's freedman, and he now passed to Otho, who inherited the patronate, with the other rights of his predecessor. (See Friedländer's *Darstellungen* etc., i, 50 fgg., 64 fg., quoted by Heraeus).

48. (1). *Situm castrorum.*

'The camp.'—C. & B. Tr.: 'the plan,' 'the structure' (and so, the arrangements) 'of the camp.'

(2). *Cum vigilias et cetera militiae munera eadem lascivia temptasset.*

'After extending the insulting frolic to the watches and the general arrangements of the army.'—C. & B. This is perhaps a free rendering of the text. The reading is doubtful, the choice lying between 'temptasset' and 'temeraset,' as the MS. reading 'temperasset' is obviously corrupt. I incline to 'temptasset' as most in harmony with the 'mala cupidine' and the 'lascivia' (= 'prurient curiosity') of the context. Besides, though Tacitus, with Roman notions of decorum, might well have qualified a woman's tampering with military duties as a 'pollution,' if this offence were mentioned alone, he would scarcely have so designated it in connexion with the crowning infamy of the next clause. Tr.: 'when she had tried the night rounds and the other duties of the soldier (cf. 'belli munia,' ii. 29) with the same wantonness.'

(3). *Galbae amicitia in abruptum tractus.*

'When forced by his friendship with Galba to a dangerous elevation.' Louandre's first translation 'entraîné dans l'abîme' (he afterwards changed it for the worse to 'au delà de toute limite') better gives the meaning of the original. Tr.: 'drawn to the path of ruin,' lit. 'dragged to the steep (of ruin).' For the primary meaning of the

phrase, cf. Verg. xii. 687, 'Fertur in abruptum magno mons improbus actu'; add An. ii. 55, 'Cum tempestas raperet in abrupta.'

(4). Et prout animum intendisset, pravus aut industrius eadem vi.

'And whether he applied his powers to vice or virtue, was always equally energetic.'—C. & B. Tr.: 'according as he applied his powers, showed the same energy in vice and virtue.' This use of the historical tenses of the subjunctive in temporal sentences, answering to the Greek optative of repeated action, is post-classical. For the use with 'prout,' cf. cc. 59, 62; with 'ubi,' cc. 49, 57; with 'quotiens,' cc. 24, 66. See Heraeus on c. 10, 7.

49. (1). Per lixas calonesque.

'Sutlers and camp-followers.'—C. & B. This translation identifies the 'lixae' and 'calones,' who, it is scarce necessary to say, were distinct. 'Lixae' (doubtless from the root of 'elixus,' 'lixa' = 'water': an original 'lixarius' perhaps would be thus clipped by the soldier's wit) are 'sutlers' or 'camp-followers,' who supplied the soldiers with goods and provisions of various kinds for their own profit; 'cālones' (probably 'caballones,' from the vulgar designation of a horse 'caballus' = 'grooms': we have a reminiscence of the connexion in Hor. Sat. i. 6, 103—'plures calones atque caballi Pascendi') are, 'soldiers' slaves' (*vid.* Döderlein, Syn. iv. 285, fgg.). Tr.: 'sutlers and camp-servants.'

(2). Sed claritas natalium et metus temporum obtentui, ut, quod segnitia erat, sapientia vocaretur.

'The nobility of his birth and the perils of the times made what was really indolence pass for wisdom.'—C. & B. Tr.: 'the nobility of his birth . . . veiled (his weak-

ness), so that,' etc. Cf. ii. 14, '*obscurum noctis obtentui fugientibus.*'

50. (1). *Utrasque impias preces, utraque detestanda vota inter duos, quorum bello solum id scires, deteriore fore, qui vicisset.*

'Prayers for either would be impious, vows for either a blasphemy, when from their conflict you can only learn that the conqueror must be the worse of the two.'—C. & B. This is a good example of Tacitus' favourite use of 'inter' (v. c. 1) 'inter duos,' *i.e.*, 'cum duo essent.' It is passed over in the translation (unless it be connected with 'deteriorem'), the last clause of which I do not understand. Tr.: 'prayers for either would be impious, vows for either an abomination, when you have two men, in whose conflict you can only be assured of this, that he will be the worse who conquers.' 'Deteriorem,' *i.e.* the worse for the Roman people, as having a longer time to develop his vices. For the use of 'uterque,' cf. Hor. O. ii. 17. 8, '*ille dies utramque | ducet ruinam*'; for 'detestandum,' Horace's '*matribus detestata*,' O. I. 1, 24, compared with 'parentibus abominatus,' Ep. 16, 8: cf. also, '*Othoniani auctorem cladis detestabantur*,' ii. 35.

(2). *Erant qui Vespasianum . . . augurarentur.*

'Some were speculating upon Vespasian.'—C. & B. Tr.: 'there were some who saw Vespasian in the distance.'

51. (1). *Expeditionem et aciem, praemia quam stipendia malebat.*

'[The army] began to hanker after campaigns and battles, and to prefer prize-money to pay.'—C. & B.

Bezzenberger's elegant and easy emendation of this very clumsy sentence—adopted by Heraeus—'*expeditionum feracium*' for '*expeditionem et aciem*,' is tempting,

and it is supported by the antithesis of 'infructuosam' in the next sentence. The only objection I can see to it is, that I have been unable to find an example of 'ferax' used absolutely in a figurative sense. On the other hand, 'expeditionem et aciem' is in Tacitus' manner: cf. 'arma atque acies,' iv. 50; 'proelium et acies,' iv. 58; 'aciem aut proelium,' An. iii. 39.

(2). Et publice donatos.

'Had received grants *from* the State.'—C. & B. Tr.: 'had received public grants,' *i. e.* grants *to* their community, as distinguished from grants to individuals. Cf. c. 66, 'publice armis multati;' iv. 55, 'publice civitas talibus inceptis abhorrebat.' Heraeus cites several examples of the same use in Cicero: cf. Verr. iv. § 20, 'at publice (*i. e.* civitati Mamertinorum) commodasti.'

52. (1). Redditi plerisque ordines, remissa ignominia, adlevatae notae.

'Many had their rank restored to them, sentences of degradation were cancelled, and marks of disgrace partially removed.'—C. & B. The translation is tautologous: not so the original. 'Ignominia,' in its strict sense (see Marquardt, Röm. Staats. ii. 552 fg.), means public exposure in the 'principia' of the camp. Here it means generally 'the infliction of disgrace.' 'Notae' are 'disciplinary punishments,' some of which are enumerated in Orelli's note from Lipsius 'de Rom. mil.' In the first clause ('redditi—ordines') reference is made to the restoration to their rank of centurions who had been cashiered or degraded. Tr.: 'in many cases centurions had their rank restored to them, inflictions of disgrace were cancelled, punishments mitigated.'

(2). In quibus sordes et avaritiam Fonteï Capitoris adimendis adsignandisve ordinibus integre mutaverat.

‘Making a *salutary* change from the meanness and rapacity which F. G. had shown in bestowing and withdrawing promotion.’—C. & B. Tr.: ‘honestly (‘*integre*’ = ‘impartially’) correcting (lit. reversing) the meanness and greed, etc.’ In ‘sordes et avaritiam’ we have one of the not infrequent cases of ἐν διὰ δυοῖν—if, indeed, it be an example—in which it is hard to say which is the leading, which the subordinate notion (what difference between ‘sordid avarice’ and ‘avaricious meanness’?) Hence we have in Tacitus ‘a. ac s.,’ as well as ‘s. et a.’ Horace (Sat. i. 6. 68) co-ordinates the notions, ‘neque avaritiam neque sordes.’

(3). Nec consularis legati mensura, sed in maius omnia accipiebantur.

‘But he seemed a greater personage than a simple consular legate, and all his acts were invested with an unusual importance.’—C. & B. Tr.: ‘and he was not judged by the standard of a consular legate, but, etc.’

(4). Simul aviditate imperandi ipsa vitia pro virtutibus interpretabantur.

‘Besides this, men eager for power were ready to represent his very vices as virtues.’—C. & B. This correctly renders the common text, which, however, can scarcely be right. How could ‘aviditas imperandi’ be attributed to subjects under the empire? I have little doubt that we should adopt Nipperdey’s easy emendation, ‘imperi dandi.’ The expression ‘dare imperium’ is, as he has shown, a favourite euphuism—if I may so render the German ‘gewählte Wendung’—of Tacitus, for the familiar ‘tradere.’ Cf. An. xii. 64; xiv. 7; xv. 52. Tr.: ‘in their

eagerness to raise him to the throne, they construed his very vices into virtues.'

(5). *Precarium seni imperium.*

'The empire is held *on the precarious tenure of an aged life*.'—C. & B. Tr.: 'the old man's power is precarious,' *i.e.*, dependent, *not on the expectance of Galba's life*, but *on the soldiers' will*, who had given and might at any time resume it. Cf. the legal definition of 'precarium,' 'quod precibus petenti utendum conceditur, tam diu, quamdiu is qui concedit, patitur.' See Her. *in loc.*

(6). *Merito dubitasse Verginium, equestri familia, ignoto patre, imparē, si recepisset imperium, tutum, si recusasset.*

'It was well for Verginius to hesitate, the scion of a mere Equestrian family, and son of a father unknown to fame: he would have been unequal to empire had he accepted it, and yet been safe, though he refused it.'—C. & B. This is a strange mistake. The grounds of hesitation are, of course, presented from the point of view of Verginius, not from that of the speaker. In *Recta* we should have 'impar ero' (or rather 'sum,' for 'impar' has reference not to *capacity*, but to *social rank*) 'si accepero, etc.' Cf. 'certus fugae, si contrarius ventus resedisset,' Plin. Ep. vi. 16; ['censet Epicurus] satis esse odiosum malum omne, cum venisset,' Cic. Tusc. Disp. iii. § 32. Tr.: '[reflecting] that he was unequal (to the dignity) if he accepted it, safe if he declined it.'

53. (1). *Vulnera.*

'Dishonour.'—C. & B. Tr.: 'griefs.'

(2). *Inter paganos corruptior miles.*

'A soldiery demoralised by intercourse with the inhabitants of the country.'—C. & B. It is worthy of

note, that 'pagani,' in the Histories, means generally 'civilians,' as opposed to 'soldiers,' rather than 'country people,' as opposed to 'people of the town.' Cf. *e.g.*, 'mox infensus praetorianis, 'vos,' inquit, 'nisi vincitis pagani,' iii. 24; 'ipsique pagani favore municipali' (*i.e.*, the inhabitants of Forum Iulii, in opposition to the praetorians, through inclination to their townsman, etc.), iv. 43. Here the translation fairly coincides with the sense; but to translate 'paganorum,' ii. 14, 'rustics,' and 'pagani,' iii. 24, 'clowns,' is quite misleading.

54. (1). Civitas Lingonum.

'The Lingones.'—C. & B. Tr.: 'the chief town of the Lingones.' 'Civitas' is similarly misunderstood in cc. 63, 64, 69.

(2). Auxiliorum miles primo suspectus, tamquam circumdatis cohortibus alisque impetus in legiones pararetur.

'At first objects of suspicion, from the idea that their infantry and cavalry were being concentrated in preparation for an attack on the legions, etc.'—C. & B. The translators have wholly misconceived the meaning of 'circumdatis,' which has reference, not to a 'concentration' of the auxiliaries,—who, as the context shows, were in familiar intercourse with the legionaries,—but to their position in the camp relatively to the Roman force. It would appear, from this passage, that the distribution of the troops in a Roman camp, described by Hyginus, according to which the legionaries surrounded the auxiliaries (*vid.* Smith's Dictionary of Antiq., p. 252) was already in use, and that a reversal of this order on the present occasion had roused their apprehensions. Louandre correctly gives the sense: '... les auxiliaires qui d'abord suspects, parce que leurs cohortes et leur cavalerie enveloppaient les légions, comme pour les écraser au besoin, etc.' Tr.: 'in the idea that their

infantry and cavalry had been placed round the legions, with the design of attacking them.'

55. (1). *Multa cunctatione et raris primorum ordinum vocibus.*

'After long delay, and then only by a few voices from the foremost ranks.'—C. & B. Tr.: 'with much hesitation, etc.,' v. c. 72. Heraeus regards '*primi ordines*' as = '*primorum ordinum centuriones*,' *i.e.*, according to Marquardt, R. Staats. ii. 360, the ten centurions (from the '*primus pilus*' to the '*decimus pilus prior*'), who, being first in the ten cohorts of which the legion was made up, had the command of their respective cohorts. If we accept this view, the translation will be 'by a few voices of the centurions of highest rank.' I cannot, however, find any example of the use of '*ordines*' for '*centuriones*' in Tacitus, though it is found in Cæsar and Livy. Cf. Cæs. B. G. V. 30, vi. 7; Livy xliv. 33. In Tacitus, on the other hand, we have '*primorum ordinum centuriones*,' Hist. iii. 22; and again, An. i. 61. It may be added, that the ordinary interpretation agrees better with '*raris vocibus*,' and with the scope of the passage.

(2). *Ut in tumultu.*

'As is usual in a tumult.'—C. & B. Tr.: '(some) in the tumult' (*i.e.*, taking advantage of it)—not 'as is usual,' but 'as was possible.'

57. (1). *Viatica sua.*

'Their rations.'—C. & B. Tr.: 'their savings.' Cf. '*Contracta ex viatico amicorum ipsiusque Caesaris pecunia*,' An. i. 37; '*Luculli miles collecta viatica multis aerumnis*, Hor. Ep. ii. 2, 26 (quoted by Heraeus). '*Loco pecuniae*' of course refers to '*balteos phalerasque*, etc.' For the various ways in which the Roman soldiers could make money ('*castrense peculium*'), v. Marquardt's Röm.

Staats.ii. 543 fg. He quotes from the Digest the following definition of the 'castrense peculium,' 'quod a parentibus vel cognatis in militia agenti donatum est, vel quod ipse filius familias in militia adquisiit, quod, nisi militaret, adquisiturus non fuisset.'

(2). Instinctu et impetu et avaritia.

'So strong were the promptings from without, their own enthusiasm, and even the suggestions of avarice.'—C. & B. Not so: 'instinctus' and 'impetus' are synonymous, and both indicate inward promptings. Cf. 'impetu et instinctu,' A. xiv. 16; 'favore quodam et instinctu,' H. ii. 46. Tr.: 'from excitement and impulse,' or if it be thought better to treat the phrase as a ἐν διὰ θυοῖν, 'from the impulse of enthusiasm.' See Dräger Hist. Synt. § 311 a. As 'instinctu' and 'impetu' thus form one motive, not two, it has been proposed to separate them from the disparate 'avaritia,' by substituting 'vel' for 'et,' a change which is facilitated by the final *u* of 'impetu': 'some were actuated by enthusiasm, others by calculating greed.'

58. Stratis iam militum odiis.

'When the resentment of the soldiery had subsided.'—C. & B. The corrupt reading of the MS. 'statis' is usually corrected into the poet. 'stratis.' Heraeus has happily substituted 'sedatis,' quoting Cic. p. red § 23, 'odium . . . potest . . . sedari.'

60. Proturbatus.

'Insulted.'—C. & B. Tr.: 'driven out.' Cf. c. 31, ii. 85.

61. Electi.

'Picked troops.'—C. & B. Not troops *d'élite*. By this name, or that of 'delecti' (*vid.* ii. 57) are designated the

detachments taken from the legions, serving 'sub vexillo,' = 'vexilla,' or 'vexillarii.' See c. 31.

65. (1). Divoduri . . . quamquam omni comitate exceptos subitus pavor terruit, raptis derepente (ms. raptisae repente) armis ad caedem innoxiae civitatis, non ob praedam aut spoliandi cupidine, sed furore et rabie et causis incertis eoque difficilioribus remediis, donec precibus ducis ab excidio civitatis temperavere.

In this well-known passage Heraeus, rejecting Gronovius' conjecture 'derepente,'—an archaic word nowhere found in Tacitus, though 'repente' is of so frequent occurrence,—writes 'raptis repente,' believing the MS. 'ae' (for which 'que' has also been suggested) to have come from the 're' of the succeeding word. At the same time he puts a full point at 'terrui,' to avoid the ungrammatical combination of the abl. abs. representing the missing perf. part. act. with an active verb having a different logical subject, and substitutes 'eunt,' or 'iere' (the latter may be objected to after 'adiere' in the preceding sentence), for 'et' after 'rabie' (cf. 'ad caedem—transiere,' ii. 66). 'Causis incertis' will then be, not an instrumental ablative, but an abl. abs., quite in the manner of Tacitus, containing a reflection on the whole sentence. Cf. An. i. 16, 'nullis novis causis'; xii. 64, 'muliebribus causis.' These very slight changes give perfect concinnity to a sentence which cannot remain as it is. Tr.: 'suddenly seizing their arms, they proceed to massacre the people of an unoffending town, not for plunder or through lust of pillage, but from rage and madness, which were all the more difficult to allay, as their causes were unknown, etc.' C. & B. evade the difficulty by translating 'raptis' as a finite verb—'in a moment they took up arms to massacre an innocent people, not for the sake of plunder, or fired by the lust of spoil, but in a wild frenzy arising from causes so vague that it was very difficult to apply a remedy.'

(2). *Universae civitates cum magistratibus et precibus.*

'Whole states, headed by their magistrates, and with prayers upon their lips.'—C. & B. Tr.: 'whole communities, with their magistrates, suing for grace.' For the meaning of 'civitas,' v. c. 54. Dräger, *Hist. Synt.* § 311. 9 a, denies the name of true *ἐν δια δύοιν* to combinations in the abl. of heterogeneous nouns, such as 'magistratibus et precibus.' The expression may be resolved by 'm. veniam precantibus.' Cf. 'factionibus et studiis,' Agr. 12; 'militibus et stipendiis,' c. 67.

(3). *Quaeque alia placamenta——tendebantur.*

Cf c. 66.

64. *Civitate.*

'Country.'—C. & B. Tr.: 'city,' v. c. 54.

65. *Uno amne discretis conexum odium.*

'The two states, separated only by a river, were linked together in perpetual feud.'—C. & B. This translation, except in the usual misconception of the meaning of 'civitas' (the reference is to the *cities* of Lyons and Vienne), fairly paraphrases this very artificial expression. The river which alone separated them was no obstacle to the clashing of their hate. The rhetorical effect of the chiasmic original would perhaps be given in translating—'the river which alone separated them was bridged by their hate.'

66. (1). *Velamenta et infulas praeferentes.*

'Assumed the veils and chaplets of suppliants.' This is a misconception. 'Velamenta,' like 'infulae,' sometimes means the woollen flocks with which the sacred boughs of myrtle, olive, etc. ('*verbenae*'), presented by (Greek) suppliants, were enveloped (= *στέμματα*); sometimes (as in Livy, xxix. 16, 'velamenta supplicum, ramos

oleae, ut Graecis mos est, porrigentes') the boughs themselves. 'Praeferentes' of course means 'offering.' Cf. the parallel statement, 'quaeque alia placamenta hostilis irae . . . tendebantur' (*i.e.*, porrectis manibus), c. 63, a passage the meaning of which seems equally to have escaped the translators. Cf. also iii. 31, 'mox v. et i. pro muris ostentant;' Liv. xxiv. 30 fin., 'ramos oleae ac velamenta alia supplicum porrigentes.' Tr.: 'holding out sacred boughs and fillets'—freely—'suppliant emblems.'

(2). Tum.

'After that.'—C. & B. Tr.: 'it was only then.' Heraeus aptly compares c. 82, 'tum Otho castra ingredi ausus.'

(3). Salutem incolumitatemque.

'The life and welfare.'—C. & B. 'Salus' is immunity from *massacre*, 'incolumitas' from *pillage*—the disasters spoken of in the opening words of the next chapter, 'plus praedae ac sanguinis.' Cf. 'caedis et praedarum initium,' c. 45. See Döderlein, Syn. 307, who cites Cic. p. Deiot. xiv., 'eorum incolumitates, quibus salutem dedisti.' Tr.: 'the lives and fortunes.'

(4). Publice tamen armis multati privatis et promiscis copiis militem iuvere.

'They were however publicly mulcted of their arms, and furnished the soldiers with *all kinds of supplies* from their private means.'—C. & B. This is the common, but I think erroneous, explanation of 'promiscis.' The parallel to the use, it seems to me, is not that cited by Heraeus, 'promisca ac vilia,' G. 5,—the object of the writer being to enhance, not to disparage the bounty of the people,—but that found in An. iv. 16, 'promisco iure;' xiv. 14, 'promisco spectaculo,' where the word means 'open alike to

all.' Is not this, too, the meaning in the well-known passage of Pliny's letter to Trajan ['quibus morem fuisse] coeundi ad capiendum cibum, *promiscuum* tamen et innoxium,' the antithesis being the *secret* societies mentioned in the context, 'quod ipsum facere desiisse post edictum meum, quo secundum mandata tua hetaerias esse vetueram'? If this view be right, the meaning will be, 'publicly (as a community, v. c. 31) punished with the loss of their arms, they furnished supplies to the soldiers *indiscriminately* from their private stores.' Perhaps, however, Forcellini is right, who explains 'promiscae' = 'publicae.'

(5). Foedis pactionibus adversus possessores agrorum et magistratus civitatum.

'Who concluded disgraceful bargains, *to the injury of* the holders of land and the magistrates of the different *states*.'—C. & B. Tr. : 'bargains with the owners of estates (along the line of march) and the magistrates of towns;' *i.e.*, bargains for 'stativorum mutationes.' For this post-classical use of 'adversus' = 'cum,' *vid.* Dräger, *Hist. Synt.* § 260, 5, and cf. 'necessitudo adversum nepotem,' An. iii. 29; 'largitio adversus amicos,' xv. 48.

67. (1). Suis militibus ac stipendiis.

'With their own troops and at their own expense.'—C. & B. Cf. c. 63, = 'with mercenaries (soldiers) of their own.'

(2). Amoeni salubrium aquarum usu frequens.

'Much resorted to as an agreeable watering-place.'—C. & B. 'Much frequented for its delightfully situated medicinal waters'—'its delightful situation and salubrious waters;' 'amoenus,' as usual, denoting natural beauty. Cf. Pl. Ep. vi. 16, 'erat enim frequens amoenitas orae.' This notice of Baden (vicus Aquensis) is interesting.

68. (1). Non arma noscere.

‘Knew not how to use their arms.’—C. & B. Tr.: ‘could not distinguish arms’ (and so the corps of which they are distinctive). Cf. ii. 93, ‘non principia noscere;’ Liv. xxii. 5, ‘tantum aberat, ut sua signa atque ordines et locum noscerent.’

(2). Sueta armis, et more militiae exercita.

‘Inured to arms and exercised in habits of warfare.’—C. & B. Tr.: ‘used to arms, and trained in military manœuvres;’ in antithesis to what is said above of the Helvetii—‘non arma noscere, non ordines sequi.’ Cf. An. ii. 52, ‘more militiae per vexilla et turmas [vagos] componere.’

69. (1). Civitatis excidium poscunt.

‘Exterminate *the race*, was the cry.’—C. & B. The expression in the original is not quite so atrocious. Tr.: ‘they demand the destruction of *the town* (Aventicum).’

(2). Militis animum mitigavit, ut est mos vulgo, mutabilem subitis, et tam pronum in misericordiam quam immodicus saevitia fuerat. effusis lacrimis et meliora constantius postulando impunitatem salutemque civitati impetravere.

This is the vulgate reading of this well-known passage, followed by C. & B. The Florentine MSS. of inferior note—there is a lacuna in the Med. from c. 69 to c. 75—read ‘ut est mos vulgus mutabile subitis, et tam pronum . . . quam immodicum s. f.’ Heraeus, wishing to connect the sentence ‘effusis . . . impetravere’ (with its new subject) with what precedes, reads, in his last edition, ‘m. a. mitigavit. *mox*, ut est vulgus mutabile s., tam *proni* . . . quam *immodici* s. fuerant, effusis, etc.’ He had adopted an

easier emendation in his first edition (which I prefer—it is easy to understand ‘milites’ from ‘vulgus’), involving the change of a single letter, and the transposition of a word, ‘*mox*, ut est vulgus mutabile s. et tam pronum . . . quam immodicum s. fuerat, effusis, etc.’ For the turn ‘ut est vulgus,’ cf. ii. 9; An. xv. 64. ‘*Mox*’ is found in a later MS. (Cod. Budensis), and its interchange with ‘*mos*’ is, as we are told, common in the old Italian MSS.; the Med., for instance, has ‘*mox*’ for ‘*mos*’ in v. 17. Its displacement, of which we have an actual example in c. 73, —where, in accordance with the usage of Tacitus, it should as Wölflin has shown, be put *before* the word to which it refers, ‘*crudelitatem*’—may here be accounted for as an obvious emendation, suggested by the common form of expression, ‘ut est mos’—cf. c. 80, ‘vulgus, ut mos est,’ c. 7, ‘ut est mos vulgi’—a form which should, I think, be followed, if the vulgate is retained. There is thus no objection to ‘*mox*’ on the ground of external authority, and the internal evidence is entirely in its favour. (1). Not to mention that it restores the connexion of ‘effusis . . . impetravere,’ the long parenthesis, ‘ut est vulgus, etc.,’ is much more in place before the verb ‘impetravere,’ than as a halting addition to ‘mitigavit.’ (2). The introduction of the period with ‘*mox*,’ etc., is quite in Tacitus’ manner—cf. i. 34, ‘*mox*, ut in magnis mendaciis’; iii. 32, ‘*mox* tertiadecumanos’; iii. 73, ‘*mox*, quod in perditis, etc.’ (3). The rhetorical force of the passage is much heightened by distinguishing the successive stages of feeling in the soldiers—fury, relenting, sympathy. Tr.: ‘soothed the minds of the soldiers. Presently, as crowds will change from sudden impulse, as much inclined to pity as they had been ruthless in cruelty, bursting into tears and with great earnestness demanding for them a better fate (cf. Verg. G. iii. 313, ‘di meliora piis’), they obtained pardon and life for the people of the town.’

70. (1). Obstricti Vitellio.

'Who were *bound* to V.'—C. & B. Tr.: 'attached.' Cf. An. xiv. 7, 'praetorianos Caesarum domui obstrictos'; so Louandre, 'ils aimaient.'

(2). Ipse paulum cunctatus est num, etc.

'He made a brief halt to consider whether he should, etc.'—C. & B. Tr.: 'he hesitated for a little whether he should *not*.' The word 'cunctor' is completely identical in meaning with the Greek *ὀκνεῖν* (originally *κοκνεῖν*), with which it is etymologically connected. (See Curtius, Greek Etym. 698.) To give it here its secondary meaning, 'to delay,' is awkward. 'Num' in Tacitus, after verbs of doubting, is = 'whether not.' Cf. ii. 37, 'num consularent'; c. 85, 'num clauderet.'

(3). Cohortibus et Germanorum vexillis.

'The auxiliary infantry and the *veteran* troops of Germany.' Heraeus, comparing 'cohortes alasque' below, regards 'vexilla' here as = 'alae auxiliares,' *i.e.*, 'vexilla equitum.' It must, however, be borne in mind, that the term is equally applicable to infantry. In any case, the troops meant are the German *auxiliaries*. See c. 31. Nipperdey thinks that the 'landsturm' = 'the local militia' are meant.

(4). Petronium† urbi procuratorem.

'Petronius the procurator.' Read after Freinsheim, 'P. *Urbicum*.' For the name, cf. An. xi. 35.

(5). Subsignanum militem et grave legionum agmen.

'The *reserves* and the heavy infantry.' This is erroneous. The word 'subsignanus' has no tactical meaning. The 'subsignani' (see Marquardt, Röm. Staats. ii. 346) are simply the legionary soldiers, serving 'sub signis'; here

in opposition to the auxiliary troops, horse and foot, serving 'sub vexillis.' The somewhat tautological 'grave legionum agmen' is added, as Heraeus points out, to contrast the heavy legionary force with the 'miles expeditus' mentioned above ('praemissis Gallorum, etc.'), and to emphasize the difficulty of the winter passage of the Alps. As to the plural 'legiones,' he reminds us that though Caecina had only one complete legion, the 21st (v. c. 61), he had 'vexilla,' detachments from the 4th and 22nd, and that Tacitus expresses himself with similar looseness in ii. 22, 25. Tr.: 'the subsignani, with the heavy train of the legions,' or more freely, 'the legionary troops, with their ponderous train.'

71. (1). E viro . . . partibus inviso.

'[By sparing] a man *opposed* to his own party.' Tr.: 'a man *hated* by his party.'

(2). Nec Otho quasi ignosceret, sed ne hostes metueret conciliationis adhibens, etc.

'Otho did not treat him as a man to be pardoned, and unwilling to blend with the grace of reconciliation the memory of past hostility, etc.'—C. & B. Of this translation it may be said, as Orelli said of Louandre's, 'satis callide loci tricas occultavit.' It is idle to attempt a version of a manifestly corrupt reading. Heraeus' happy emendation, sanctioned by Nipperdey, will commend itself to the judicious, 'sed deos testes mutuae reconciliationis adhibens.' Tr.: 'calling the gods to witness their mutual reconciliation.'

72. (1). Disparibus causis.

'A *less worthy* cause.' Tr.: 'different.' The hatred of Tigellinus can scarcely be called 'unworthy.' Cf. ii. 7.

(2). Virilia scelera.

'All the crimes of *maturer years*.'—C. & B. Tr.: '*mas-*

culine vices,’ *i.e.*, avarice and cruelty, in opposition to the *effeminate* excesses (*‘vitia’*) of his earlier years.

(3). *Quisque pessimus*—*adversus publicum odium privatam gratiam praeparat*; unde nulla innocentiae cura, sed vices impunitatis.

‘All the greatest villains look for private friendship to shelter them from public destruction, caring not to be free from guilt, but only to insure their turn in impunity.’—C. & B. More accurately, ‘provide in private interest a defence against public hatred; thus they care not to avoid offence, but assure themselves a return of impunity.’ Their recklessness is the consequence, not the motive, of their action. It is customary with Tacitus to omit the verb after ‘unde’ and ‘inde.’

(4). In fora.

‘Into the forum.’—C. & B. Tr.: ‘the fora’ (Romanum, Iulium, Augustum, etc.) More freely, ‘to the public squares’; ‘sur les places’—Louandre; or, if the markets are included, ‘places of public resort.’

73. *Adversa dissimulantis principis fama.*

‘The Emperor, who incurred much obloquy by his *duplicity*.’—C. & B. Tr.: ‘with damage to the Emperor’s reputation for his *connivance*.’ See c. 26.

76. *Initio Karthagine orto neque expectata . . . proconsulis auctoritate: Crescens, etc.*

‘Carthage taking the lead. In that city Crescens . . . without waiting, etc.’—C. & B. The translation separates ‘neque ex. p. a.’ from its context. Tr.: ‘Carthage taking the lead, without waiting, etc.’

77. *Nobiles adolescentulos avitis et paternis sacerdotiis in solacium recoluit.*

‘He consoled the young nobles by *reviving* the sacer-

total offices held by their fathers.'—C. & B. Tr.: 'by *investing* them *anew* with the priestly offices of their fathers.' The expression is inaccurate; the fathers are supposed to be *reinvested* in the persons of their sons.

78. (1). Civitates Maurorum.

'States of Mauretania.'—C. & B. Tr.: 'communities.'
See c. 54.

(2). Ostentata magis quam mansura.

'More for display than for permanent utility.'—C. & B. This is probably a translation of the conjectural reading, 'ostentui.' The MS. reading is 'ostenta,' which Heraeus has changed into 'ostentata,' as Tacitus uses 'ostentum' only as a substantive. The antithesis of 'mansura' is in favour of this reading, as is the remarkably similar passage in Cic. Agr. 2, 4, where the word 'ostentare' is used exactly as here to denote a promise which cannot be realised: 'largitio (cf. above, 'eadem largitione') verbis ostentari potest, re vera fieri . . . nullo pacto potest.' Tr.: 'rather offered to their hopes than destined to last,' *i.e.*, as they were cancelled by his rival. For the use of 'mansura,' cf. 'obscurum et mansurum,' ii. 49.

79. (1). Dispersi aut cupidine praedae graves onere sarcinarum.

'Were scattered, and in their eagerness for plunder had encumbered themselves with heavy baggage.'—C. & B. Surely 'cupidine praedae' is displaced. Read 'cupidine praedae dispersi;' or, 'dis. cup. praed. aut graves, etc.,' an order which will better explain the displacement. Tr.: 'scattered in their eagerness for plunder, or encumbered, etc.'

(2). Sed tum umido die et soluto gelu neque conti neque gladii, quos praelongos utraque manu regunt, usui, lapsantibus equis et cataphractarum pondere.

‘But as on this occasion the day was damp and the ice thawed, what with the continual slipping of their horses, and the weight of their coats of mail, they could make no use of their pikes or swords, which being of an excessive length, they wield with both hands.’—C. & B. Tr.: ‘but as there was then a thaw, and their horses kept slipping from the weight of their armour as well (*i.e.*, as from the thaw), they could make no use of their pikes and of the enormous swords, which they wield with both hands.’ In ‘*praelongos*’ we have the familiar attraction of the attribute by the relative.

(3). *Tamquam et ipse felix bello et suis ducibus suisque exercitibus rempublicam auxisset.*

‘As though it were he that had commanded success in war, and aggrandised the State by his generals and armies.’—C. & B. Tr.: ‘As though he had himself achieved success in war, and had with *his* generals and *his* armies aggrandised the State.’ ‘*Suis*,’ emphatic before its subject; ‘*ducibus*’ classed, as an instrument, with ‘*exercitibus*.’ For the omission of ‘*esset*,’ after ‘*felix*,’ see c. 40.

80. (1). *Tempus in suspicionem, causa in crimen, adfectatio quietis in tumultum evaluit.*

‘The time *provoked* suspicion, the *motive challenged* accusation, and the elaborate attempt at quiet *ended* in a disturbance.’—C. & B. Tr.: ‘the time bred suspicion, the occasion accusation, and the studied attempt at quiet disturbance.’ The notion that underlies ‘*evaluere*’ is that of ‘growth’ (cf. *cum evaluissent flagella pedes binos*, Pl. xvii. 15, 25), ‘*evaluit*’: = ‘waxed into.’ ‘*Causa*’ here is = ‘*res ipsa*’: see Gerber and Greef, *Lexicon Taciteum*, and cf. ‘*ad ea Vologeses nihil pro causa rescripsit*,’ An. xv. 14.

(2). Obsequia bonorum nox abstulerat.

'The obedience of the better disposed was neutralised by the darkness.'—C. & B. Rather, 'precluded.' For this meaning of 'auferre' ('to render impossible'), see c. 52, 'auferre privati securitatem'; iii. 84, 'deformitas exitus misericordiam abstulerat'; Cic. Lael. § 12, 'mori-undi sensum celeritas abstulit.'

81. (1). Erat Othoni celebre convivium primoribus feminis virisque.

'Otho was giving a crowded entertainment to the most distinguished men and women of Rome.'—C. & B. Tr.: 'Otho was giving a banquet attended by a numerous company of men and women of the highest rank'; more freely, 'O. was at table with a numerous company of men and women of exalted rank.' Young students may be reminded that 'feminis virisque' are ablatives depending on 'celebre.'

(2). Cum timeret Otho, timebatur.

'Otho felt as much alarm as he inspired.'—C. & B. Tr.: 'inspired the alarm he felt.'

83. (1). Turbidis rebus.

'How disturbed was the country.' Tr.: 'that the times were distracted,' cf. c. 31, *in*; c. 88, *fin*.

(2). Vulgus et plures.

Cf. c. 19, 'medii ac plurimi.'

(3). Ne detrectatione quidem.

'Much less to any shrinking from.'—C. & B. Tr.: 'Not even to, etc.'—a less criminal motive, or simply 'nor.'

84. Parendo potius quam imperia ducum sciscitando res militares continentur.

‘It is by obeying not by questioning the orders of commanders, that military power is kept together.’—C. & B. Tr.: ‘It is on obedience that the very existence of an army depends.’ Cf. Cic. Ver. ii. § 149, ‘a quo (hominum genere) summa res publica—continetur’ (‘on which the existence of the State depends’); pro Sest. § 92, ‘iudicia quibus omne ius continetur’ (which are the soul of the law’); and (in the act.) Tusc. Disp. iii. § 55, ‘intellecto eo, quod rem continet’ (‘which includes the whole matter’). Cf. also Tac. H. iii. 86; An. xiii. 49. The usage is developed from the converse use of ‘teneri.’ Cf. Cic. Off. i. 45, ‘quare hoc quidem effectum sit, in officiis deligendis, id genus officiorum excellere, quod teneatur hominum societate,’ *i. e.*, the kind of duty on which depends the existence of society, lit. which is held fast by it, as its indispensable condition. See Nägelsbach. Stil. § 112.

85. (1). Non tamen quies . . . formidine.

C. & B., following the ordinary interpretation of this much discussed passage, translate ‘*militibus . . . sparsis*’ as an independent sentence. Bonnet, by a simple change in the punctuation—placing a comma before ‘*Vitellianos*’—has restored the sense and grammar of the passage: ‘*strepitus telorum et facies belli. et militibus ut nihil in commune turbantibus, ita sparsis per domos occulto habitu et maligna cura in omnes, quos nobilitas . . . rumoribus obiecerat, Vitellianos quoque venisse in urbem . . . plerique credebant.*’ Tr.: ‘and as the soldiers, though they made no concerted disturbance, had scattered themselves in disguise through private houses, keeping a malignant watch on all whom their rank had exposed to obloquy, it was believed by many that the soldiers of Vitellius too, etc.’

(2). Ad studia partium noscenda.

‘To learn the feelings of the different parties.’ Tr.: ‘to sound men’s feelings for their party.’ Cf. c. 76, ‘non partium studio.’

(3) In publico.

‘In public.’—C. & B. Tr.: ‘in the streets,’ v. cc. 19, 86.

(4). Ut quemque nuntium fama attulisset, *animum vultumque* conversi.

This is the reading followed by C. & B. instead of the Med. ‘conversis’; rightly, perhaps, as it is observed by Heraeus that Tacitus never uses the Greek accusative except with the *nom.* of the adj. or part. For the mood of ‘attulisset,’ see c. 48 (4).

(5). Ne diffidere dubiis ac parum gaudere prosperis viderentur.

‘Anxious not to appear discouraged by unfavourable *omens*, or too little delighted by *success*.’—C. & B. Tr.: ‘that they might not seem discouraged by suspicious, too little gratified with favourable, intelligence.’

(6). In clamore tamen, et ubi plurimae voces, aut tumultu verborum sibi ipsi obstreperantes.

‘Yet only did so in the midst of clamour, and when many voices were heard at once, drowning their own speech in a tumult of words.’—C. & B. The translation erroneously confounds two distinct statements. Tr.: ‘in the uproar, however, and when many were speaking at once, *or* drowning their own utterance with a confused noise of words’ (*i. e.* ‘*praepropere prolatorum*,’ as Walther expresses it)—or, perhaps, ‘crying themselves hoarse with bawling.’ Cf. the German, ‘sich verschreien.’

86. (1). Tiberis—qui proruto ponte ac strage obstantis molis refusus, etc.

‘The river—broke down the wooden bridge, was checked by the heap of ruins across the current, etc.’ Tr. : ‘dammed by the destruction of the wooden bridge, and the sinking in of the mole which faced its bank,’ *i. e.* the mole at the Emporium, further down the stream. Cf. ‘relabentem (Tiberim) secuta est aedificiorum et hominum strages,’ An. i. 76.

(2). Quod—iter belli esset obstructum, a fortuitis vel naturalibus causis in prodigium—vertebatur.

‘The fact—that his route to the war [was] *obstructed by causes either fortuitous or natural* was regarded as a prodigy.’—C. & B. The translation of ‘a—causis’ as the inst. abl. is a strange error. Tr. : ‘in disregard of fortuitous or natural causes, was looked on as a prodigy,’ *i. e.* was taken out of the domain of accident or natural cause, and transferred to the supernatural. For this use of ‘a,’ cf. ‘pleraque ab saevis adulationibus aliorum in melius flexit,’ An. iv. 20. The influence of ‘a—causis’ has doubtless determined the use of ‘vertere’ instead of the usual ‘trahere,’ cf. ii. 20 ; v. 30, etc. On the other hand, ‘vertere’ is generally used in this sense by Livy, and its full import is illustrated by our text. Cf. ‘quaeque alia in deum iras vertunt,’ Liv. iv. 9 ; ‘cum omnium adversorum prosperorumque causas in deos verterent,’ xxviii. 11.

87. (1). In numeros legionis composuerat.

‘Had enrolled in the ranks of the legion.’—C. & B. Tr. : ‘had formed into the divisions of a legion,’ *i. e.* had given them the legionary formation of cohorts, maniples, and centuries (‘numeri’); ‘in’ denoting the result, ‘so as to form.’ These troops are the ‘classicorum ingens numerus’

of c. ii. 11, distinct, it will be observed, from the 'legio classica' designated 'prima' in the same chapter.

(2). Vires et robur.

'Strength and stay.'—C. & B. Tr. 'sinews and core'; unless the use be that of ii. 11, 'quo plus virium et roboris' ('[numerical] strength and solidity'). Somewhat different is the application in Liv. xxi. 1, 'tantum virium et roboris' ('resources and endurance'). The same fundamental distinction underlies all the uses: 'strength exhibited in action' and 'inherent strength.'

(3). Curam navium Moschus libertus retinebat ad observandam honestiorum fidem minister datus.

'Oscus retained the charge of the fleet, and went to watch the fidelity of men more honourable than himself.'—C. & B. Tr.: 'The (Imperial) freedman Moschus (in the vulgate 'M' is absorbed by the final letter of the preceding word) retained the control of the fleet, to which he had been appointed commissary, that he might watch the fidelity of his betters.' Moschus had been appointed by Nero to the commissariat of marine ('cura navium'), an office which he continued to hold ('retinebat') under Galba and Otho. As to his surveillance, compare the position of the political Commissioners to the army of the French Committee of Public Safety. 'Honestiorum,' *i. e.*, 'quam libertus.' For the use of 'datus' = 'constitutus,' cf. An. xv. 28 (where a similar office is mentioned), 'minister bello datus'; ii. 12, 'duces dederat': cf. also Caes. B. C. iii. 1, 'ut arbitri darentur.'

(4). Is urbanae militiae impiger, bellorum insolens, auctoritatem Paulini, vigorem Celsi, maturitatem Galli, ut cuique erat, criminando, quod facillimum factu est, pravus et callidus bonos et modestos anteibat.

'An active officer at home, without experience in war, he founded perpetual accusations on the high influence of

Paullinus, on the energy of Celsus, on the mature judgment of Gallus, in fact, on each man's special excellence, *a thing most easy to do ; and thus the unscrupulous and the cunning were preferred before the modest and the good.*'—C. & B.—The latter part of this translation is obviously inaccurate: indeed I can scarcely follow it. Tr.: 'an active officer in the service of the capital (garrison duty), but without experience in war, he was always carping at the ascendancy of Paulinus, the energy of Celsus, and the ripe judgment of Gallus, in fact, at the distinguishing excellence of each; and thus a man unprincipled and crafty—a thing very easy to do—got the better of the conscientious and the good.' Modestus (σώφρων) = 'limit-loving,' 'law-abiding'—sensitive to obligation, whether moral or legal: cf. Cic. p. red. in Sen. § 4, 'consules modesti legumque metuentes;' p. Arch. § 9, 'Metellus sanctissimus modestissimusque omnium'; and the familiar use of 'modestia' = 'military subordination.' 'Bonitas' = 'goodness of nature,' is the opposite of 'malitia' = 'craft,' 'knavery.' Cf. Cic. Lael. § 47, 'bonitas malitiam [aspernatur]'. The order of the words 'pravus . . . modestos' is chiasitic. 'Quod facillimum factu est' goes with the last clause: it is Tacitus' manner to insert a parenthetic explanation *before* what it explains; cf. iii. 40, 'mox consilium utrumque aspernatus, quod inter ancipitia deterrium est, dum media sequitur, nec ausus est satis nec providit'; see also iii. cc. 31, 56; i. 15, 'pessimum—venenum,' etc. The transitive use of 'anteibat,' not found in classic prose, should be noted.

88. (1). Neque arta custodia neque obscura.

'Not in strict or *secret* custody.'—C. & B. 'Obscura' rather 'mean,' 'degrading,' as in the phrase 'obscuri loco nati': he was in 'libera custodia,' probably with some of the magistrates answerable for his safe keeping.

(2). Non participes aut ministros bello.

'Not indeed to share or serve in the campaign.'—C. & B. A tautology. The 'ministri bello' are, as we have seen, c. 87 (3), non-combatants—the commissariat of the army.

(3). Ambitione stolidi.

'Senseless *ostentation*.'—C. & B. Perhaps, 'desire to ingratiate themselves.' Heraeus cites 'multos ambitione, plures formidine trahebat,' iii. 55; cf. also 'ambitionem scriptoris,' i. 1.

(4). Multi, adflicta fide in pace anxii, turbatis rebus alacres et per incerta tutissimi.

'Many whose credit had been shaken in the years of peace regained their spirits amidst the confusion of the time, and found their best safety in revolution.'—C. & B. This translation leaves out 'anxii,' and misses the point of 'incerta.' Tr.: 'Many who in peace had been filled with anxiety from shattered credit ('adflicta' stronger than 'adfecta,' cf. iii. 65), regained their spirits in disorder, and found their best security in peril.'

89. (1). Magnitudine nimia communium curarum populus expers.

'The people whose vast numbers cut them off from all interest in the State.'—C. & B. This can scarcely be right. Heraeus elegantly inserts 'imperii' after 'magnitudine,' comparing ii. 38. Andresen reads 'exp. rei publicae.' The sense is the same. Accepting the former, translate 'excluded by the vastness of the empire from interest in public affairs.' The horizon was too wide for their bounded intelligence.

(2). Pacis adversa rei publicae pertimere (Orelli).

'Men dreaded for the commonwealth the miseries of peace.'—C. & B. 'P. a. ad rem publicam pertinere,' Heraeus after Oberlin. Rightly, I think: cf. c. 30, 'bellorum [exitus] ad vos pertinebunt'; An. iv. 8, 'ita nati

estis, ut bona malaque vestra ad rem publicam pertineant.' The MSS. are corrupt. Tr.: 'the miseries of peace affected the state.'

90. (1). Reliquias Neronianarum sectionum nondum in fiscum conversas revocatis ab exilio concessit, iustissimum donum . . . sed festinata iampridem exactione, usu sterile.

'He presented to those who had been recalled from exile what was left of the Neronian confiscations, *or* had not yet been paid into the Imperial treasury, etc.'—C. & B. The translators apparently make a distinction (of which there is nothing in the original) between confiscations of Nero which remained unsold, and the proceeds of sales which had not yet been paid. Heraeus, again, is, I think, mistaken in referring the 'sectiones Neronianae' to the original confiscations of Nero. The 'sectiones' are clearly the sales of the nine-tenths of the Neronian confiscations reclaimed by Galba, of which we are told in the 20th chap. Cf. 'ubique *hasta et sector*,' and '*exactioni* triginta equites praepositi.' Tr.: 'he granted to those recalled from exile the remnant, not yet brought into the Imperial treasury, of the sales of Nero's confiscations' (*i. e.* of those dealt with by Galba, which the writer supposes present to his readers' minds).

(2). Trachali ingenio [Othonem] uti credebatur.

'Oth.' is bracketed by Heraeus, upon an observation of Wölflin, that Tacitus always joins the *nom. sing.* of a personal subject with 'creditur.'

(3). Quasi dictatorem Caesarem aut imperatorem Augustum prosequerentur, ita studiis votisque certabant.

'As if they were applauding a Dictator like Caesar, or an Emperor like Augustus, they vied with each other in their zeal and good wishes.'—C. & B. The translators have misconceived the meanings of the prefixes to the names 'Caesar' and 'Augustus.' 'Imperatoris' is here

the 'praenomen Imperatoris'—as it is styled by Suetonius—the official designation assumed by Caesar's heir, when in 714 he dropped his gentile name, and substituted 'Imperator' for his praenomen 'Caius' (*vid.* Mommsen, R. Staatsrecht, ii. 2, 743 fg.). The title 'Dictator,' again, is prefixed to 'Caesar,' as a standing title, indicating 'the most practically prominent of his many offices,' and that to which he was designated for life in 710, the year of his death (*vid.* Mommsen, Hist. of Rome, iv. 468 fg.). There is a certain *bizarrierie* in the expression 'a Dictator like Caesar,' as though we should say, 'a Protector like Cromwell.' Tr. : 'a Dictator Caesar, an Emperor Augustus.'

The word 'prosequerentur,' here translated 'were applauding,' is by Bonnet, quoted by Heraeus, explained 'were escorting,' with reference to Otho's departure from Rome, mentioned in the next sentence. In this view Roth concurs, and it is probably right. It may be, however, that 'prosequi' is to be taken in the more general sense of 'attending,' and that the limiting words, which this sense requires, are to be found in 'studiis votisque' in the succeeding clause. In that case, we might translate: 'the people vied in acclamations and blessings [upon Otho], as though they were acclaiming a Dictator Caesar, an Emperor Augustus.'

(4). Ex libidine servitii : ut in familiis, privata cuique stimulatō, et vile iam decus publicum.

'[They acted] from mere love of servitude: as it might be in some private household, each had his own motive, and the public honour went for nothing.'—C. & B. Here again the translation fails to give the author's meaning. 'Familiae' does not mean 'some private household,'—private households need not be given up to selfishness, and devoid of public spirit,—but 'establishments of slaves.' Cf. 'familiae senatorum,' c. 80. In the phrase 'libidine servitii,' Heraeus regards 'servitium' as = 'servi,' translating 'from servile humour,' and this sense certainly best

harmonizes with the succeeding words. On the other hand, it may be said, that though Tacitus frequently uses 'servitium,' sing. and plur., in a concrete sense, and to denote *individual* slaves (in this differing from Cicero, with whom the concrete 'servitium,' sing. and plur., is used *collectively*, as *e.g.* Verr. v. § 9, where 'servitium' means 'the slaves of the country'), he uses it equally in the abstract sense (cf. 'servitii necessitas,' ii. 6; 'ad servitium fregerat,' ii. 17; and I will venture to add, 'ingenio suone an servitii,' An. xii. 30, which is cited by Heraeus as an example of the concrete use), and a comparison of 'libidine adsentandi,' c. 1, and 'libidine talia loquendi,' c. 12, makes, it must be admitted, in favour of an abstract interpretation here—'par entraînement pour la servitude,' Louandre. The point, however, of the succeeding illustration is so much improved by the alternative, and possible, rendering, that I venture to adopt the suggestion of Heraeus. Tr.: 'from servile humour: as it is with the menials of a house, each had his personal motives, and the public honour now went for nothing.'

WILLIAM NESBITT.

NOTE on 87 (3) 'minister datus.'

I omitted to say that Messrs. C. & B. have here probably followed the text of Orelli, 'comitatus.' There is a lacuna in the Med. MS., and the inferior MSS. vary between 'imitatus,' 'immutatus,' and 'invitatus.' The emendation 'minister datus,' which so well harmonizes with the sense and with the style of Tacitus, is by Heraeus attributed to Gronovius. It is suggested that the final syllable of 'minister' fell away, and that the unmeaning 'minidatus' easily passed into 'imitatus,' whence the other variants.

W. N.

I.—THUCYDIDES IV. 116. ὁ δὲ Βρασίδας (ἔστι γὰρ ἐν τῇ Ἀηκόθῃ Ἀθηνᾶς ἱερόν, καὶ ἔτυχε κηρύξας, ὅτε ἔμελλε προσβάλλειν, τῷ ἐπιβάντι πρώτῳ τοῦ τείχους τριάκοντα μνᾶς ἀργυρίου δώσειν), νομίσας, κ. τ. λ.

NO commentator seems to have found the least difficulty in this passage, though the amount of the reward is out of all proportion to the circumstances of the case. The fort Brasidas wanted to capture was not of great importance, and his success was pretty certain, so that his main object was merely to save time. Consequently he offers a reward to the first soldier who ascends the fortification. But seeing that the ordinary pay of a soldier was at the highest one drachme per day, is it credible that he offered 30 minae? For this sum would amount to *more than eight years' pay*. Can we conceive a modern English general offering £150 reward in a similar case? I think therefore that some copyist, who had before him a very early Ms. in capitals, mistook Δ for Λ, and wrote out τριάκοντα, when the sense requires τέτταρες. Four minae would be, roughly speaking, one year's pay—a very large bribe for exceptional valour in battle, and worth giving to the temple, as we find in the sequel, but no absurdity like the enormous bonus of 30 minae in an age when money was scarce and dear.

II.—ON THE TERM Μηδίζειν.

It is remarkable that although the Greeks knew perfectly the difference between Medes and Persians, and though all their serious conflicts were with the Persians, as successors and lords over the Medes, the technical term for siding with the Persians is always Μηδίζειν. It must,

therefore, have come into common use while the Medes were still the dominant people in Western Asia. This fact suggests various interesting inferences. In the first place, Mr. Paley's notion that verbs in $\alpha\zeta\epsilon\iota\nu$ and $\iota\zeta\epsilon\iota\nu$ are of neo-attic formation, and prove the modern character of the Homeric dialect, seems here clearly refuted. For this word must be Ionic, and formed before 560 B. C., probably (as I shall show) much earlier.

But what were the circumstances which produced this early coinage? I think the wars between the Medes and the Lydians—a protracted struggle, carried on with varying success, and in which we may feel sure that the Greeks were constantly employed as mercenaries or as auxiliaries. The original use of the word must therefore have been to side with the Medes against the Lydians, who were the nearer and the more dangerous power to the Asiatic Greeks. How ordinary a thing this was, and how much the Greeks practised it, may be inferred from Cyrus' answer to them when they offered him submission on the same terms exacted by Crœsus (Herod i. 141). He says that when he had before prompted them to revolt against Crœsus, they would not do it. This, I fancy, was no novel policy, but a mere continuation of the old practice of the Medes.

We are in the habit of underrating the intercourse between the Greeks and inner Asia at this time. Such exiles as Antimenidas (Alcæus' brother), and the mercenaries who went with Psammaticus into Nubia—such travellers must have made the Medes and Persians well acquainted with the affairs of the West. Hence, when Cyrus met Crœsus at Pteria, his delay was caused not by want of readiness, but by his deliberate preparations for a long campaign—the collection of a train of camels, the tampering with Crœsus' Hellenic subjects, and such other preliminaries. His march to Sardis, which took the

Lydians by surprise, was probably aided and directed by Greek renegades, who had often gone to and fro from the coast, who knew the roads, and the powers of resistance in the Lydian capital. They had in fact been so long in the habit of *Medizing*, that even the advent of the Persians could not change a well-established term.

III.—PLAT. APOL. 26, E. καὶ δὴ οἱ νέοι ταῦτα παρ' ἐμοῦ μαν-
θάνουσιν, ἃ ἔστιν ἐνίοτε, εἰ πάνυ πολλοῦ, δραχμῆς ἐκ τῆς
ὀρχήστρας πριαμένοις Σωκράτους καταγελᾶν, κ. τ. λ.

The first and most obvious interpretation of this passage, that books could be bought in the orchestra of the theatre of Dionysus, when not otherwise occupied (adopted by Dacier and by Boeckh), has been abandoned very generally, but for very strange reasons. The real objection to this interpretation is that the theatre of Dionysus was out of the way from the agora, and quite out of the thoroughfare which booksellers must frequent, and where we know that they used to read out passages from their books to tempt buyers. Stallbaum, however, quoting many authorities, old and new, sets up another interpretation, based, I think, on a series of blunders, and tells us that Socrates means to say the youth of Athens can go to the theatre, and hear the views of Anaxagoras put forward in the plays of Euripides, and that this can be done by paying an entrance fee of a drachme at the most.

This rendering, adopted, I believe, by all the recent commentators, and sanctioned by many scholars incidentally, seems to me teeming with absurdity. In the first place, we know that there was no difficulty in procuring Anaxagoras' book, for Socrates speaks of it specially (*Phædo*

cc. 46-7), and there is no reason to think that it was dear, as he was a poor man, and as slaves worked hard at multiplying copies. A drachme then would represent three or four shillings of our money in value. Secondly, can we imagine Socrates, who complains in this very speech of being traduced on the stage, venturing to set up this as the honest way of learning what an author had to say? How few and obscure are the known references to Anaxagoras in Euripides as we have him! How doubtful they are, and how carefully concealed! Could anything be more vague and foolish than to send men from the accessible book to these scattered and doubtful references? These *a priori* difficulties are increased by the sum mentioned, *one drachme*, since we know that the regular admission to the theatre was two obols (τὸ διώβολον). To sit ἐν τοῖς διωβόλοις is opposed in Demosthenes *de Corona* to a reserved seat, which accordingly the commentators imagine must have cost more—but falsely. There were reserved seats for magistrates and ambassadors; but I challenge anyone to prove so improbable a thing as a variation in the price of seats which would give a rich man a better seat. Those who assert such a thing seem to me to know little indeed of the Athenian democracy.

But Stallbaum refers to Casaubon (on Theophrastus [p. 246, ed. 1648] in the chapter περὶ βδελυρίας), as proving that the admission fee sometimes rose to a drachme (i. e. six obols). What does Casaubon adduce? Nothing but a note of Hesychius on δραχμὴ χαλαζῶσα, which says, ἐπὶ Διοφάντου τὸ θεωρητικὸν ἐγένετο δραχμή—an obvious blunder, as every modern editor of Hesych. has seen, for θεωρικόν, and opposed to Suidas' statement (θεωρικά, art. 3), that two obols were the ordinary admission. But apart from the objection that Athens could hardly have been so rich under Diophantus (395 B. C.) as to issue a gratuity of a drachme to all her citizens, what has this to do with the admission

to the theatre? Indeed, as if to guard against such a supposition, Suidas says, at the end of his article, *ἦν δὲ καὶ ἄλλα θεωρικά ἃ διενέμετο ἐν ταῖς ἑορταῖς ἢ πόλιν*. The commentators, laying hold of this one extraordinary benevolence to the people—called by lasting proverb the *hail of drachmes*—have invented another statement, devoid of all foundation and probability, that the lessees of the theatre obtained the whole of the Theoric grant from each citizen—in fact, that its variation made no difference to the recipients except they stayed at home! Can we imagine such a thing possible? Surely when the Theoric fund was large, and the distribution accordingly increased, this was a bonus to the people, not to the lessees.

I see, therefore, no evidence whatever that the admission was ever above the two obols, and for this reason, in addition, reject the interpretation of Stallbaum. Now, indeed, we may find people proving that the admission rose to a drachme by the aid of this passage in Plato—a wonderful instance of the distant effects of a blunder in a good scholar.

What, then, does the passage mean? I think all the commentators have shipwrecked on the word *ὀρχήστρα*, which they never suspected to have a double meaning. Quite apart from the pit of the theatre, there was a platform, of probably semicircular shape, just above the agora, on the side of Areopagus—that is, just beside, but out of the greatest thoroughfare in Athens. On this platform the statues of Harmodius and Aristogiton only were allowed to be set up. I take it that here the booksellers had their stalls, and from this *orchestra* a man might purchase the tract of Anaxagoras for a drachme.

This is surely simpler and better than to accept the nonsense talked by Suidas about *θεωρικά* (art. 1), which is plainly refuted by the common reference to two obols as the admission fee.

IV.—ON A SUPPOSED ALLUSION TO PHILIP IN THE ORATION *de Symmoriis* OF DEMOSTHENES.

εἰ μὲν οὖν ἕτερός τις τρόπος ἦν δυνάμεως, ᾧ τοὺς βαρβάρους οἷόν τε ἦν ἀμύνασθαι, ἕτερος δέ τις, ᾧ τοὺς Ἕλληνας, εἰκότως ἂν ἴσως φανεροὶ πρὸς ἐκείνον ἐγιγνόμεθ' ἀντιταττόμενοι· ἐπεὶ δὲ πάσης ἐστὶ παρασκευῆς ὁ αὐτὸς τρόπος, καὶ δεῖ τὰ αὐτὰ εἶναι κεφάλαια τῆς δυνάμεως, τοὺς ἐχθροὺς ἀμύνασθαι δύνασθαι, τοῖς οὖσι συμμάχοις βοηθεῖν, τὰ ὑπάρχοντ' ἀγαθὰ σώζειν, τί, τοὺς ὁμολογοῦντας ἐχθροὺς ἔχοντες, ἑτέρους ζητοῦμεν, ἀλλ' οὐ παρασκευαζόμεθα μὲν πρὸς τούτους, ἀμυνόμεθα δὲ κἀκείνους, ἐὰν ἡμᾶς ἀδικεῖν ἐπιχειρῇ; καὶ νῦν μὲν καλεῖτε πρὸς ὑμᾶς αὐτοὺς τοὺς Ἕλληνας. ἐὰν δέ, ἃ κελεύουσιν οὗτοι, μὴ ποιῇτε, οὐχ ἡδέως ἐνίων ὑμῖν ἐχόντων, πῶς χρὴ προσδοκᾶν τινὰ ὑπακούσεσθαι.

Dionysius of Halicarnassus has led the way (Rhet. 8, § 7) in here imagining a reference to Philip of Macedon in the orator, as the declared enemy of Athens, and has been followed or corroborated by the Greek scholia, and by all the modern panegyrist of Demosthenes, who desire to extol his prescience, and who find his general reticence in this speech (B.C. 354) very hard to reconcile with the late and sudden declarations in the 1st Philippic (B.C. 351). For in 354 B.C. Philip's ambitious policy ought to have been plain enough. A. Schäfer acquiesces in this view, though so slightly mentioning it as to indicate that he may have felt some suspicions. But Blass is express, and so are most of the editors.

Yet if anything can be clear, it is that no reference to Philip is, or can be, intended by the orator. Look at his argument. If there were a different way of preparing against a *Greek*, and against a *barbarian* enemy, then our preparations could be interpreted by the Persian as directed against himself; but as there is not, as preparations against Greek and barbarian enemies are the same in kind, why not prepare against the *known Greek*, and not

the doubtful barbarian enemies? Well, it is contended that the orator, by a Greek enemy, meant Philip! Surely this is impossible, seeing that he consistently speaks of him as a wretched Macedonian not fit to be associated with Greeks, or of the same race or standing. But we have (even were not this argument amply sufficient) distinct evidence that Philip, however really encroaching on the dominions of Athens, was not then regarded as a state enemy, far less a dangerous one. In the Letter of Philip, a document now generally recognised as a real and important state document, we find the king complaining that though *at the present crisis it was proposed to call upon him to join the league of Greeks against the Persians*, they afterwards attempted to set the Persian against him, in order to suit themselves—§ 6. *πρὸ μὲν γὰρ τοῦ λαβεῖν αὐτὸν Αἴγυπτον καὶ Φοινίκην ἐψηφίσασθε, ἂν ἐκείνός τι νεωτερίζῃ, παρακαλεῖν ὁμοίως ἐμὲ καὶ τοὺς ἄλλους Ἕλληνας ἅπαντας ἐπ' αὐτόν.* If this was so, how could he be in any way described by Demosthenes as an *acknowledged enemy*? The fact is, that Demosthenes was later than he ought to have been, in spite of his own boasting in later life, to discover the schemes and the ability of Philip, and his 1st Philippic strikes quite suddenly a note of alarm foreign to his preceding public speeches.

If any authority were required to assist in refuting the assumption of Dionysius and of the Germans, I have with me one who, on a historical question of this kind, is worth them all put together—I mean Grote, who in his account of the speech (xi. p. 399) not only ignores any such reference, but also (p. 406) states distinctly that there is here *no reference* to Philip.

JOHN P. MAHAFFY.

NOTE ON ΚΑΣΙΓΓΗΤΟΣ.

PROFESSOR CURTIUS, in his *Grundzüge*, p. 144, under the word *κάσις* makes the following statement:—"Dass *κασίγνητος* so gut wie *ἀδελφός* nur den Bruder von derselben Mutter bezeichnete, beweist Δ 257, *κασίγνητον καὶ ὄπατρον*."

That the assertion is untenable, *pace tanti viri*, will be seen by a comparison of the following passages from Homer.

In M. 370, we read—

Ὡς ἄρα φωνήσας ἀπέβη Τελαμώνιος Αἴας,
καὶ οἱ Τεύκρος ἅμ' ἦε κασίγνητος καὶ ὄπατρος.

On the other hand, in Θ. 281, we find "the king of men" himself addressing Teukros thus—

Τεύκρε, φίλη κεφαλὴ, Τελαμώνιε, κοίρανε λαῶν,
βάλλ' οὕτως, αἶ κεν τι φόως Δαναοῖσι γένηται
πατρί τε σὺ Τελαμῶνι, ὃ σ' ἔτρεφε τυτθὸν ἐόντα
καὶ σε νόθον περ ἐόντα κομίσσατο ᾧ ἐνὶ οἴκῳ.

Again, in E. 359, Aphrodite, daughter of Diōne (id. 370), addresses by the title of *φίλε κασίγνητε* Ares, who in line 893 is expressly called by Zeus himself the son of Hērē—

μητρός τοι μένος ἐστὶν ἀάσχητον, οὐκ ἐπιεικτὸν.
Ἥρης, κ. τ. λ.

Also in O. 545, Ἐκτωρ, *κασιγνήτοισι κέλευσεν* and those

objects of his exhortation, Melanippus et hoc genus omne, are seen, by what follows, to be simply the *cousins* or *clansmen* of Hector, the meaning which is also found in the recurring formula κασίγνητοί τε ἔσσι τε, which seems to mean nothing more than "*kith and kin*."

From these passages I think it will be seen that there is no Homeric evidence at least for ascribing to κασίγνητος the meaning of *uterine brother*.

As regards external and collateral evidence from other languages, there seems to be none. What the first part of the word means is an αἵνγμα, not τοῦπιόντος ἀνδρός διαιτεῖν. Curtius compares only the Ang.-Sax. *hise* = man, and that, too, with hesitation.

The Homeric usage of the word would rather seem to indicate that it had originally the meaning of *kinsman* or *relation*, somewhat analogous to the use of the Latin *frater*, which required to be more exactly defined by an adjective when it strictly meant *a brother*. Cf. Cicero's *frater sanguine patruelis, amore germanus*.

Moreover, the passage A. 257, so far from being repugnant to the explanation attempted above, even supplies a certain amount of evidence in its favour. The line occurs in the description of the overthrow of the two sons of Antenor, Iphidamas and Koôn, by Agamemnon. Now, whilst the poet states explicitly that Iphidamas was the son of the 'fair-cheeked Theanô,' and had been reared by his mother's father, Kissês, he is silent as regards the mother of Koôn. It is scarcely unreasonable to infer that the poet would have described both of them as sons of Theanô, if such had been the case. Probably, then, Koôn was a νόθος held by his father Antenor in equal honour with his legitimate offspring, like Edmund in "King Lear," or "The Bold Bastard of Orleans" in "Quentin Durward." Moreover, we know that Antenor "loved the

gallimaufry" from E. 70, where we are told of Pedasus, son of Antenor—

ὅς ῥα νόθος μὲν ἔην, πύκα δ' ἔτρεφε δῖα Θεανῶ,
ἴσα φίλοισι τέκεσσι, χαριζομένη πόσει ψα

Antenor being a Trojan, that is, of Asiatic race, had probably, like Priam himself, polygamous proclivities.

*Οπατρος would thus define more closely the wider meaning expressed by κασίγνητος.

WILLIAM RIDGEWAY.

TWO NOTES ON ARISTOPHANES.

RANÆ, 60.

ΔΙ. τοιοντοσὶ τοῖνυν με δαρδάπτει πόθος
Εὐριπίδου. ΗΡ. καὶ ταῦτα τοῦ τεθνηκότος;

N^O one, I fancy, can read this without stumbling at τοῦ. I will not go so far as to assert that it is not Greek, but I say that καὶ ταῦτα τεθνηκότος is much better Greek, and is what one expects. I read—

καὶ ταῦτ' ἔτος τεθνηκότος;

'though he's been dead this twelvemonth?' Cf. Thesm. 876, τέθνηκε Πρωτέας ἔτη δέκα, 'Proteas is dead these ten years.' Euripides died the year before the Frogs were exhibited.

THESMOPHORIAZUSAE, 704.

ΧΟ. ὥς ἅπαντ' ἄρ' ἐστὶ τόλμης ἔργα κἀναισχυντίας.
οἶον αὖ δέδρακεν ἔργον, οἶον αὖ, φίλαι, τόδε.

Read—

ὥς ἅπαντ' ἄρ' ἐστὶ τόλμης ΜΕΣΤΑ κἀναισχυντίας.

Μεστά dropped out owing to the similarity of the adjoining syllables, and ἔργα was inserted instead of it. The phrase πάντα μεστά was nearly as common in Greek as *omnia plena* in Latin. παραδειγμάτων δὲ μεστά πάντα, Suidas s. v. ἀγοράσαι.

ARTHUR PALMER.

SIR W. ROWAN HAMILTON ON THE ELEMENTARY CONCEPTIONS OF MATHEMATICS.

To the Editor of "HERMATHENA."

SIR,

The accompanying letters from Sir William Rowan Hamilton to his pupil and friend Lord Adare, afterwards Earl of Dunraven, were written in the early part of the year 1835. Forming a series of six letters, with a fragment of a seventh, they were, nevertheless, scattered through the great mass of papers which after his death were placed in my hands by his representatives; and I have thought myself fortunate in being able to link them together, for they seem to me to contain an exposition of the elementary conceptions of Mathematics valuable at once for characteristic depth and comprehensiveness, and for clear development.

The series, though continuous, stops far short of its intended completion, for it will be seen that, towards the close of the sixth, a seventh letter is promised, in which was to be *commenced* the application to Algebra of the principles previously laid down. Of such continuation only a draft of the beginning of the seventh letter has been discovered, but the fragment is an important one, and I have reason, from other parts of his correspondence, to infer that this seventh letter expanded into that *Essay on Algebra as the Science of Pure Time*, which was presented by him on the 1st of June, 1835, to the Royal Irish Academy, and published in the seventeenth volume of the

Academy's "Transactions," as preliminary to the treatise on *Conjugate Functions*, which had been communicated by him to the same Body on the 4th of November, 1833.

A comparison of the *Introductory Remarks* to that Essay with these letters will show that in the former he resumes from the latter his distinction between the several schools of Algebraists, and that the very first of the letters anticipates the definition of Algebra which, through the title of his Essay, has since become famous.

I offer these letters for insertion in "*HERMATHENA*," in the belief that their contents will opportunely appear at a time when the fundamental ideas of Algebra are engaging much attention, and I desire that they may serve as earnest of more from the same source likely ere long to see the light; for I may take this occasion to state, that at length some hopeful progress has been made by me in the task of arranging for publication the papers of Sir W. R. Hamilton in connexion with a biographical memoir. The task has been unavoidably a very prolonged one, in consequence of the great number and the disorder of the papers, and of other causes needless here to mention.

I remain, Sir,

Faithfully yours,

R. P. GRAVES.

1, WINTON-ROAD,

October 1st, 1878.

I.

OBSERVATORY,

March 4, 1835.

MY DEAR ADARE,

I have often intended to try to revive, in an easy, but systematic form, my own and your recollections of our early conversations upon Algebra, especially with regard

to the spirit and philosophy of that science: and will not longer defer the attempt, though I may be only making a beginning now, which may remain for a long time, and perhaps for ever, an uncompleted sketch.

When you commenced your studies with me, I did not assume any knowledge on your part of Algebra, nor of anything beyond the first elements of Arithmetic. I was anxious to begin at the beginning, and to initiate you by a method which should suppose no previous attainment. And I was glad that you had, in fact, read no Algebraical work, though you were a good and expert arithmetician.

In *Arithmetic*, properly so-called, Number is considered as an answer to the question *How many*, and as constituting a Science of *Multitude*, founded on the relation of *more and fewer*, or ultimately of the *many* and the *one*. In a more complex Science, of *Magnitude* and *Measure*, which may perhaps be called *Metrology* (though often classed as a higher part of Arithmetic), Number is the answer to the question *How much*, and the fundamental relation is that of *greater and less*, or of *whole and part*. But in *Algebra* I taught that Number answers the question *How placed in a succession*, the guiding relation being that of *before and after* (or of positive, negative, and zero); and the Science itself being one of *Order* and *Progression*, or, as it might be called concisely, of PURE TIME. To *count*, to *measure*, to *order*, are three different, although connected, acts of thought, and belong to these three different, although closely connected, Sciences, of *Arithmetic*, *Metrology*, and *Algebra*. Groups *as counted*, magnitudes *as measured*, positions or states *as ordered*; and, therefore, finally the *relations* of the counted to the counter, of the measured to the measurer, of the ordered to the orderer—such are the ultimate objects of these three acts of thought, and the ultimate or elementary conceptions of these three Sciences.

To dwell a little longer on this distinction. In Arith-

metic we consider and compare groups of individuals, with reference, not to the nature, but merely to the multitude, of those individuals; regarding, for example, a pair of stars and a pair of men as similar, in so far as both are pairs, and denoting both for this reason by a common name, by the cardinal or counting number "Two." In Metrology, we consider and compare such magnitudes as lengths or times, or any other measurable magnitudes, with reference to their measures merely; regarding, for example, a yard and an interval of three weeks as similar, if measured by a foot and by a week respectively, and denoting them then by one common name of measure, the quantitative or measuring number "Triple." In Algebra, we consider and compare positions or states of the same or of different progressions, with reference only to their arrangements in that or in those progressions; regarding, for example, *to-day* as similar to a point upon a line, if *to-day* be referred to yesterday and to-morrow as standards of arrangement in time, and if the point upon the line be referred in like manner to any two other points thereon, between which it is supposed to be also exactly intermediate: and we use in this case one common ordinal or ordering number, or name of arrangement [such as "Half-way"], for these two similar states, as will be afterwards more fully explained. Equinumerous groups in the first science, proportional magnitudes in the second, and corresponding positions in the third, are considered, for the purposes of these sciences, as entirely coinciding with each other, group with group, magnitude with magnitude, position with position; and the name of any one such group, or magnitude, or position, is extended to every other which in this view coincides with it. By forming such general thoughts, and marking them with such general names, it becomes possible to construct and to use a quotitative, quantitative, or ordinal language; and so to

propose and resolve (at least in part) this widely comprehensive problem, including perhaps all others in these sciences—"To name every thought, and to interpret every name, of multitude, magnitude, or succession."

Let this suffice at present, from your affectionate friend,

WILLIAM R. HAMILTON.

II.

OBSERVATORY,

March 13, 1835.

MY DEAR ADARE,

I attempted, in the former letter, to distinguish Algebra, as the Science of Order, from Arithmetic, as the Science of Multitude, and from an intermediate Science of Magnitude, which I proposed to call Metrology. And having shown the possibility and advantage of establishing general names, or names of relation, quotitative, quantitative, and ordinal, which should belong, some to groups as counted, others to magnitudes as measured, and others to states of a succession as ordered, or ultimately to the *relations* of multitude, magnitude, and order—the comprehensive problem was proposed, "To *name* every thought, and to *interpret* every name, of multitude, magnitude, and succession"; or, "To *construct* and to *use* a quotitative, a quantitative, and an ordinal language."

Now, whether we look to the Arithmetical, or to the Metrological, or to the Algebraical part of this great problem, we find that in each it is possible to adopt three principal views, and thus to impress on the research any one of three different characters. Whether Arithmetic, or Metrology, or Algebra be our study (and the remark extends to other studies also), we may belong to one or other of three great schools, which I shall call the *Theoretical*, the *Philological*, and the *Practical*, according as we chiefly aim at clearness of thought, or symmetry of ex-

pression, or ease of operation;—according as *Intuition*, or *Language*, or *Rule*, the *sapere*, or the *fari*, or the *agere*, is eminently prized and sought for;—according as obscurity, or inelegance, or tediousness is most dreaded and guarded against. You know enough of my habits and inclinations to determine without difficulty the school to which *I* belong, and to place me at once in the class of the *theoretical*, as seeking more a clear and lively intuition, by whatever cost of meditation or mental discipline to be attained, than language, however perfect in its structure, or rules, however easy of application. But you also know how willingly I admit the utility of those more *practical* persons, who study to improve such rules and such applications; and how highly I respect those algebraical grammarians or *philologists* who, pursuing Algebra as a language, care chiefly for removing its anomalies, and would reduce it to an elegant and symmetrical system of words and signs. For to this philological school belong very many of the best modern writers upon Algebra; and especially Woodhouse and Peacock, of Cambridge, and Professor Ohm, of Berlin, men of learning, patience, and originality, to whom we may add the brilliant name of Lagrange; though Fourier and Cauchy lean more to the Theoretical School, in the sense in which I have defined it, as elevating Intuition above Language.

Indeed it must be owned that if the Theoretical Algebraists be rightly possessed by the idea that Algebra is *more than a Language*, yet the language of Algebra is so beautiful in its kind, so wonderful as an organ, so necessary and so prominent in the study of the science itself, that reasonably and naturally has it received a large share of attention, and not only now, but from the earliest times, has the philological spirit directed or influenced the progress of Algebraic discovery. And, therefore, though I have professed myself as belonging to the Theoretical School, and make it my chief aim to imbue and, as it

were, impregnate the whole of Algebra with Intuition, yet in subordination to this I desire to cultivate its Philology too; and in now seeking to revive your remembrance of our old conversations, I shall perhaps make the language of the science—its symmetrical system of signs, with their logical rules of combination—hold even a prominent place; or at least shall treat this department of study with a deserved and sincere respect. But for this entrance on the *Language*, along with the *Science, of Succession*,—for the beginning of the solution of that great two-fold problem of Algebra, already mentioned, “To name every thought, and to interpret every name of order”—I must refer you to a future letter, and remain, in the meanwhile,

Affectionately yours,

WILLIAM R. HAMILTON.

III.

OBSERVATORY,

March 14, 1835.

MY DEAR ADARE,

In writing a third letter of this series—for a series it seems to be growing, and no doubt an extensive series would be needed, to do justice to Algebra as a subject—let me indulge myself a little longer with generalities before we proceed to details. It is the less improper to do so, because you are not actually beginning, but only reviewing the study; and you, as well as I, must exert a sort of imaginative, and as it were dramatic power, in throwing ourselves back into that state and time in which you made your earliest steps in Algebra, while I had the pleasure to assist. Having, therefore, devoted the first of these Letters to the distinguishing of Algebra from other kindred SCIENCES; and the second Letter to the distinction between the Theoretical and other SCHOOLS; I shall now

make a few general remarks on the connexion and the contrast of the Analytic and Synthetic processes, or FORMS of thought, as applicable to every Science and to every School.

The two Greek words, *Analysis* and *Synthesis* (ἀνάλυσις, σύνθεσις), are used by Mathematicians and Metaphysicians in many senses, which seem however to have all some reference to the etymology of those two words, or of the cognate Latin forms, Resolution and Composition; as if we said, in a more English style, Putting asunder and Putting together—Taking to pieces, and Making up—Loosing and Binding—Decomposing a thing or thought into its simpler elements, and Compounding these elements again, so as to produce that thing or thought. Thus, in Chemistry, there is an *Analysis* performed, when Water is decomposed into Oxygen and Hydrogen; and there is a *Synthesis*, when these elements are combined in such a manner that Water results. In Dynamical Astronomy, it was *Analysis*, when Newton extracted from the complex phenomena of the motions of the planets and satellites the elementary laws of motion and of attraction; it was *Synthesis*, when he proceeded to combine these elementary laws, and to deduce from them the planetary and lunar motions. The general process of reasoning, itself, was *analysed* by Aristotle into the principles and rules of Logic; and, consciously or unconsciously, those principles and rules are applied to, and combined *synthetically* with, the premisses of every argument, when anyone reasons correctly. Assertions, propositions, judgments, are divided by Kant into *Analytic* and *Synthetic*, by an analogous and subtle distinction. He holds that an assertion or *Judgment* is *Analytic*, when the agreement of the Predicate with the Subject of the assertion is an identical and purely logical truth, deduced from a mere analysis (or examination) of the *meanings* already supposed to belong to the two signs com-

pared (without any new and foreign connexion between the two thoughts themselves, whether established by Experience, or by purely mental Intuition): as, for example, the assertion, *All Bodies are extended*, which is indeed an useful assertion, but only useful for purposes of language, or, at most, for clearness only, and not for enlargement of thought, belonging to the class *Erläuterungsurtheile*, but not to the class *Erweiterungsurtheile*; since it results from a mere analysis or examination of the meaning previously attached to the word *Bodies*. On the other hand, Kant gives the assertion, *All Bodies are heavy*, as an example of a *Synthetic Judgment*, deduced not from the mere taking to pieces of the meanings of subject and predicate, but rather from the putting of these meanings together, through the cement of Experience and Induction. The thought of Body, such as we usually form it, and such as in these assertions we intend it to be formed, *includes* the thought of Extension, but *not* the thought of Heaviness; it gives therefore Extension by *Analysis*, but cannot be connected with Heaviness, except through a foreign and (in this case) empirical *Synthesis*. Following out the same principle of distinction, Kant holds that *all* judgments of Experience, and *nearly all* those of Pure Mathematics, are *Synthetic*, not *Analytic*; the judgments of Experience pronouncing never that two thoughts are inseparable in the mind, but that two properties go together in nature; and those of Pure Mathematics, pronouncing indeed of two thoughts, that they *ought* to accompany each other, but not that the one *does* in fact contain the other, by logical, as well as scientific comprehension, if we except some few elementary axioms, such as "the Whole is greater than the Part." Thus, in Geometry, he remarks that the thought of *straight* does not *contain* the thought of *short*, though we *see*, through the Intuition of Space, that the shortest line is the straight one. And in Arithmetic, the thoughts of *Five* and *Seven*

and *Sum* do not *include* the thought of *Twelve*; but we *find*, by a mental trial, by calling up an Intuition of counted things, that the sum of Seven and Five *is* Twelve. I am disposed to agree with these remarks of Kant; but since they relate to the classification of Judgments, Assertions, Propositions, Sentences, they leave free for a separate classification the *combinations*, and the processes of *discovery*, of such judgments or propositions; and do not tend to weaken the received distinction between the *Analytic* and *Synthetic* METHODS, or processes, in mathematical researches generally, whether of a geometrical or algebraical kind. On *this* distinction, especially in its reference to arithmetic, I shall touch in the following Letter.

Meanwhile remaining

Your affectionate friend,

WILLIAM ROWAN HAMILTON.

THE VISCOUNT ADARE.

IV.

OBSERVATORY,

March 16, 1835.

MY DEAR ADARE,

The remarks in my last letter on *Analysis* and *Synthesis* in general may have prepared you to recollect the distinction between the Analytic and Synthetic METHODS of arriving at any truth;—the former method by taking it to pieces, the latter by building it up;—the one by analysing the truth into its simpler elements, the other by constructing it from those;—the analytic method by going from the unknown to the known, the synthetic method by proceeding from the known to the unknown. If I were fonder than I am of coining words, or giving them new meanings, I might be tempted to call these two the *Centripetal* and

Centrifugal, or the *Centre-seeking* and *Centre-flying* Methods. For the Analytic tends always inwards from the obscure surrounding space to some central home of light already known and won; while the Synthetic Method radiates from that centre, and is ever aiming outwards to the unconquered world around. But Examples, better than Poetry, may make the contrast clear, and I shall take first the arithmetical example already given from Kant, as an instance of a *Synthetic Judgment*, which, although truly such, may yet be *discovered* by the *Analytic*, as well as by the Synthetic Method.

I admitted that the Assertion, "The Sum of Seven and Five is Twelve," is rightly called by Kant a *Synthetic* assertion, in the sense that we might fully understand the meanings of *Seven* and *Five* and *Sum*, and therefore the meaning of the "Sum of Seven and Five," as a number which is to be determined by the process of summing from the given numbers Seven and Five, and yet we might not have actually determined this new number, so as to know it to be the number "Twelve"; whereas the assertion, "Eight is the Sum of Seven and One," may fairly be called by contrast an *Analytic* assertion, because there is no better way of explaining the word, or of forming the notion of *Eight*, than by defining it to be (in Arithmetic) the mark of that multitude which is next greater than, or *exceeds by one*, the multitude named *Seven*; so that in thinking of *Eight*, we have *already* thought of the sum of Seven and One, while in merely thinking of *Twelve* (as the Sum of Eleven and One, or, if you like that other definition better, as the Sum of Ten and Two) we have not *yet actually* thought of the Sum of Seven and Five; nor in merely thinking of this latter Sum have we *actually thought* of Twelve, though Arithmetical Trial or Proof may effect a *Synthetical connexion* between these *two different complex thoughts*, and show that they belong or *conduct to one*

common intuition of multitude. When we say that Eight is the Sum of Seven and One, we take to pieces the complex meaning which we had already given to the subject of the proposition, we *analyse* the thought already formed of Eight; but when we say, "The Sum of Seven and Five is Twelve," we pass to a *new* thought, by a mental *putting-together*. A simpler instance of what Kant would call an Analytic proposition is the following:—"Seven is Seven"; and a simpler instance of a Synthetic proposition is this, "*Five more than Seven is also Seven more than Five*"; for this last assertion appears to me (as it has also done to several other thinkers) to require a *proof*, however easily such proof may be supplied.

But what is the process of mind by which we *discover* the Synthetical connexion above asserted to exist between "The Sum of Seven and Five," as one thought, and the number "Twelve," or the "Sum of Ten and Two," as the other? This *process may* certainly be Synthetic; and for a full and formal *proof*, it *must* be so; but we may, instead, adopt an analytical method, so far at least as *discovery* is concerned. We may proceed synthetically from the known to the unknown, or analytically from the unknown to the known. It is a synthetical method, when setting out with the known number "Seven," we pass successively through the five other known numbers, "Eight, Nine, Ten, Eleven, Twelve," and rest in the last as the result. It is an analytical method, when we set out from the unknown and sought result, *the Sum, whatever it may be*, of Seven and Five, and go backwards by successive decomposition through the stages "Seven and Four and One," "Seven and Three and One and One," till we are conducted to something known, such as we may here suppose that the sum of "Seven and Three" already is. But it is highly important to observe (as a check on the usurpations of Analysis, and in vindication of the rights of Synthesis),

that even when something known has thus been reached, by this *centre-seeking* process, the problem is not yet fully and formally solved, the communication between the Subject and Predicate of the theorem is not yet entirely established, until we have returned upon our steps, or at least made sure that starting from the known we *can*, by the alternate way, the *centre-flying* method, arrive again at the unknown, and effect a Synthetic connexion. Thus, in the last example, if we suppose it known that the "Sum of Seven and Three" is "Ten," we have analysed the "Sum of Seven and Five" by successive steps into this other phrase, "The Sum of Ten and One and One"; but the arithmetical problem is not yet entirely resolved, nor is the theorem that was proposed entirely and formally demonstrated, until a Synthesis, though short, has compounded these last elements of "Ten and One and One" into "Eleven and One," or "Ten and Two," that is, ultimately into the complex thought which we have agreed to mark by the name "Twelve": besides that other Synthesis, supposed to have been before effected, which showed that the sum of Seven and Three was Ten.

This little example may suffice as a preliminary specimen of the connexion and contrast between the Analytical and Synthetical Methods; and I remain, &c., &c.,

W. R. H.

V.

OBSERVATORY,

- March 17, 1835.

MY DEAR ADARE,

I do not know whether you may not think the remarks of the last two letters too subtle or too vague to be connected in any useful way with the problem of the two first; but perhaps a little consideration will convince you that the distinction between *Analysis* and *Synthesis*, however obscurely or vaguely it may have been set forth by me, has really a very clear and close connexion with the distinction between the two parts of that problem; the *Naming* of thoughts, and the *Interpretation* of names, of multitude, magnitude, or order. To *name* a thought or an intuition, is either to pass from that Thought, or from that Intuition, to its own proper sign and mark in a system of signs *already* established and known; or else it is to fix *now* for the first time on some new sign, which sign, however, by the very act, we adopt as thenceforth to become a permitted point of reference, and which we now by definition attach to the thought or intuition in question, admitting thus *that* thought or that intuition into the household of the known and the familiar, and assigning to it, in that household, a place of its own for ever: and both these modes of naming, the mediate and the immediate, seem plainly to be modes of *analysis*, as passages from the unknown to the known, from the *thought* regarded as obscure or new, to the *name* which is or is to become familiar. But in the converse process of *interpreting* a name, we do not analyse but *construct* a thought, by rules already established, or from elements already given. The sign to be interpreted is here the starting post and centre, from which known point we go, by a known path of *Synthesis*, until we reach the thought or intuition signified. It appears then

that on the whole, the *Naming* is an Analytic and the *Interpreting* is a Synthetic office; at least in that *Theoretical School* described in my Second Letter, in which the mind aspires to thoughts rather than words, though it must reach the former through the latter, and views things signified, through a transparent veil of signs. In the *Philological School*, on the contrary, in which Names are regarded not as media or *instruments* of vision, but as actually constituting of themselves the principal *objects* of research, the foregoing distinction would be reversed, and instead of Analysing or Constructing a *Thought* by Names, we should have to speak of Constructing or Analysing a *Name* by Thoughts; if indeed this School in its consistency and ultimate rigour should not reject *these* operations altogether, and substitute for them a mere logical and symbolical composition and decomposition of signs, according to rules of language, in which nothing but symmetry is required, and the absence of express contradiction: while the *meaning* or *signification* of the signs,—their reference to thoughts or intuitions,—is put aside as a foreign thing from this merely symbolical science. But in that other and (I think) higher School, the Theoretical—which looks beyond and through the sign to the thing signified,—the three great acts of mind described in my First Letter, *to count, to measure, and to order*, are evidently *analytic* acts, and the *naming* of things or thoughts through them is essentially an *analytic* process: while the converse office is the *synthetic*, which *interprets* a name proposed, and by the rule embodied in that name (of multitude, or magnitude, or succession) constructs the thought or the intuition (of the group, or quantity, or state), in Arithmetic, Metrology, or Algebra.

It may illustrate these general remarks to apply them to the Roman Numeration: for example to the symbol IX, which is, we know, equivalent to our English "Nine."

This *written name*, or sign of multitude, IX, bears obvious traces of the analysis by which it has been formed. Hold up to view the fingers of both hands, counting both thumbs as fingers; you will have the intuition of a multitude or group, which from its natural connexion with our bodies and our wants has received in perhaps all spoken languages a simple or special name, and has been treated as a known or simple thought, to which analysis may tend, and from which synthesis may begin. The English call it "Ten": the Romans wrote it X. Hide now one thumb, and you will have¹ another intuition; you will see a different group, a lesser multitude: the English name it "Nine," a word as simple as the former, but the Romans marked it by a complex written sign, IX. Our *Ten* and *Nine*, and their *Decem* and *Novem*, seem all alike to be simple and arbitrary and uncompounded names, and they may be supposed to have been immediately given to the respective groups, without any derivation of the one English word from the other, or of the one Latin word from the other; as if these two different multitudes had been named in an arbitrary order, and both the intuitions been regarded as equally simple and elementary—both equally fit to be the close of any future analysis, or the starting-post in a process of synthesis. But in the forming of the Roman written sign IX, there is an obvious reference to the sign X already chosen: we see that the group *ten*, composed of all the fingers, was regarded as more familiar (although more numerous) than the group *nine*, with one thumb away: the less familiar and (thus far) less simple intuition was compared with the more familiar, *it was analysed that it might be named*, and the result was the sign IX, recording this distinctive property of *Nine*, that it has been found by *analysis* to be *one less than Ten*,—not indeed

¹ [Construct]—thus added to MS. by W. R. H., without striking out "have.

by a separation of the multitude Nine into its parts, but by a resolution of the *complex thought* into its simpler connected conceptions. I need not dwell upon the converse process of *Synthesis*, by which we return from the familiar thoughts of One and Ten in this particular mode of combination, and *interpret* the written *name* IX, till it yields up the intuition of Nine: for you will easily apply these remarks to all the past arithmetical examples, and will see their bearing on those questions of Algebra to which we shall next proceed.

W. R. H.

VI.

OBSERVATORY,

March 18, 1835.

MY DEAR ADARE,

For the reasons given in my last letter I hold that in Algebra, as in other sciences (if studied in that Theoretical school which uses Names as subordinate to Thoughts), *to name* is an *analytic* act, and every *spoken or written name* (whether word or other sign) *is the result or record of an analysis*; declaring, if *immediately* and arbitrarily imposed (as in the Roman Arithmetic the word Decem or the sign X), that the signified thing or thought either *must be* or at least *is chosen to be* regarded as a *simple* element, insusceptible of further analysis, or at least not analysed yet into any simpler or more familiar components; or else recording, if the name be *mediately* given, and by rules of composition of signs (like the Roman numeral IX discussed in the foregoing letter), that the signified thought *has already* been analysed into others, and recording likewise the special process of that analysis. But since the use of a sign is to signify, and since every analysis supposes a previous possible synthesis—because

a mark should be the mark of something, and a thing or thought which may be analysed may be compounded also,—therefore I hold that every Name is not only *formed* as the result or record of an analysis, but may be likewise *used* as the beginning or the rule of a *synthesis*, and is accordingly so used when we *interpret* it. *To name* is a verb active; it supposes some *object* to be named, some thing or thought or intuition, which either is or might be given and present. Now the having of such an *intuition*, the contemplating of such an *object*, is the natural and necessary antecedent of the *earliest* act of naming; although analogies of language and of thought may afterwards suggest *derived* and complex names, for which the objects and answering intuitions remain to be discovered or called forth. Such seems to be the process of the mind in the actual formation of Science; and such (I think) should be the process in study and instruction also. Among our *conscious* processes and acts, Analysis precedes and Synthesis must follow. The determination of the relation from the related thing must be the first act; and not till after this can we hopefully or reasonably attempt to determine consciously the related thing from the relation. For the conscious knowledge of a relation seems never in the growth of the human mind to precede the perception of a related thing, as given by thought or intuition; though relations themselves have all their seats *à priori* in the constitution of that very mind, and are so far innate ideas, or more correctly *innate forms*. The *form* precedes the *matter* in order of nature and of dignity, but in order of time and of visible progressive development the perception of the matter precedes the consciousness of the form. And therefore, in instruction, the *naming of a given object* should be earlier taught than the *interpreting of a given name*. The teacher ought first to present to the learner the *matter*, the complete intuition, and then assist him to attain from this to the consciousness

of the *form* within him. But after he has thus analysed he may construct; after he has acquired an *inductive method* of relating a given object to others more simple or familiar, he may be led to a converse method of constructing or applying this relation, so as to discover or make *new objects*, by *deduction*. Having first turned inward on himself from the obscure and manifold around him, he may then look forth with cleared and strengthened sight, and choose his own path of progress.

It may seem inconsistent with these views, respecting the natural order of instruction, that I have dwelt so long on generalities and preliminary principles, instead of proceeding sooner, or perhaps immediately, to the actual objects or intuitions in Algebra to which they are designed to apply. But you remember that, at the outset of these letters, I announced it to be my chief purpose to revive your recollections, and to make them more clear and systematic, respecting the views which I had put forward in our old conversations, on the spirit and philosophy of the science. And since, as was remarked in an intermediate letter of the series, you are not now actually beginning but only reviewing the study, it is permitted and almost required that I should adopt a different method now from that which I employed when I wished to introduce you for the first time to a class of conceptions then new to you. I may now address you more as a man, and as one in whom the consciousness of the processes of his mind has been already developed by exercise—though there are none of us to whom it is not useful to have this consciousness developed more and more. Yet, it seems time that I should come to particulars, and apply to Algebra, as the Science of Order, those general remarks which I have been making on all scientific processes, and which I have only exemplified as yet in the simplest questions of Arithmetic. And this application to Algebra I think that I

shall really *commence*, in my next letter, without any intervening digression : though I will not answer for my long keeping close to the details, or that I may not soon leave them for a while in pursuit of some new generality. Meantime, I remain, &c.,

W. R. H.

April 7.

Kant holds that in the application of our thoughts to things there is a Synthesis *previous* to all Analysis, and that indeed we never analyse but what we had ourselves compounded :—and this, which is a fundamental article of Kant's system, may seem to contradict what I have said in the Sixth Letter ; but you will observe that in dating (there) Analysis as earlier than Synthesis, I spoke of *conscious* acts, while that first Synthesis assumed or proved by Kant is confessed to be a blind unconscious working of the Mind reacting upon Sensible Objects, and giving them their unity, and even their existence as Objects definite and specific, by casting them in its own innate forms or moulds of sense and thought.

VII.

April 16th, 1835.

MY DEAR ADARE,

I have often expressed in conversation and in these letters my opinion² that Algebra is the Science of Order and Progression, or, more concisely, of PURE TIME ; that is, the mathematical Science of Time as disengaged on the one hand from the dynamical notion of Cause and Effect, and on the other hand from all empirical marks and measures suggested by particular phenomena ; just as

² Without striking out this word, the word "conviction" is written over it by W. R. H.

Geometry is the Science of Pure Space, or the mathematical Science of Space as disengaged from all dynamical notions of localised force, and from all empirical knowledge of actual shapes and sizes, and positions and motions of bodies. I must now add that the *Science of Pure Time* according to this conception contains *not only Algebra*, as contrasted in these letters with Arithmetic and with Metrology, but *Arithmetic and Metrology also*; that is, it contains the Sciences of Quotity and Quantity, or of number and of measure, as well as the Science of Order. We use familiarly the phrases "How many times?" "For how long a time?" "At what time?"—and these familiar forms of inquiry contain within themselves the outlines and principles of construction of the three last-mentioned Sciences. If we can answer, under all sufficient conditions, the question *How often*, or *How many times*, and can interpret or understand every sufficient answer to such a question, then are we perfect masters of Arithmetic as the Science of Quotity or Number. If, whenever the conditions are sufficient, we can enunciate and can interpret an answer to the question *How long*, or *For how long a time*, we are acquainted with the whole of Metrology, as the abstract Science of Quantity and Measure. And if, in every case of appropriate and sufficient conditions, we can assign and interpret a date, so as to form and to use in each case the answer to the question *When*, or *At what time*, we possess [(as it appears to me)] all that Algebra can ask or teach as the Science of Order and Progression. And these three questions Quoties, Quamdiu, Quando,—the How often, [the] How long, and [the] When,—with their respective answers So often, So long, or Then,—the Toties, Tamdiu, and Tunc,—while they contain those three separate Sciences of Arithmetic, Metrology, and Algebra, are plainly subordinate to the general conception of Time; and a Science of Pure Time, to be complete, must comprehend them all. * * *

ON A GENERAL PROPERTY IN THE THEORY OF ATTRACTIONS.

A MATERIAL particle being supposed in free equilibrium, at an unoccupied point of its space, under the action, attractive or repulsive, of a system of masses, or a quantity of matter, distributed in any manner in the space; it is well known that, for the law of the direct simple distance, its equilibrium is always stable for attractive and unstable for repulsive action; while, for that of the inverse square of the distance (except under special circumstances, of exceptional occurrence, when it is absolutely neutral), it is, on the contrary, always intermediate. The general property, of which the above are particular cases, has not hitherto, so far at least as I am aware, been noticed by writers on the Theory of Attractions, and may in consequence be of interest to the student in the subject. It is simply as follows:—

A material particle being supposed in free equilibrium, at an unoccupied point of its space, under the action, attractive or repulsive, of a system of masses, or a quantity of matter, distributed in any manner in the space; its equilibrium (when not absolutely neutral, as under special circumstances it may be in certain exceptional cases) is always stable for attractive and unstable for repulsive action, or, on the contrary, is always intermediate, according as the law of the action is a direct or an inverse power of the distance.

To prove this, it is only necessary to show, in accordance with a well-known general principle in Dynamics, the application of which to the case in question is obvious,

that (special circumstances excepted) the Potential V of the system is always a minimum in the former case, and only stationary in the latter case; which may be readily done as follows:—

Conceiving the particle to receive a small displacement $\xi\eta\zeta$ from its position of equilibrium xyz under the action of the system; it is to be shown that the function, representing accurately in sign and approximately in magnitude the consequent change in V , viz.,

$$\left[\frac{d^2 V}{dx^2} \cdot \xi^2 + \frac{d^2 V}{dy^2} \cdot \eta^2 + \frac{d^2 V}{dz^2} \cdot \zeta^2 + 2 \cdot \frac{d^2 V}{dydz} \cdot \eta\zeta + 2 \cdot \frac{d^2 V}{dzdx} \cdot \zeta\xi + 2 \cdot \frac{d^2 V}{dxdy} \cdot \xi\eta \right],$$

is positive for all values of $\xi\eta\zeta$ in the former case, and does not preserve a common sign at all for different values of $\xi\eta\zeta$ in the latter case.

Since, generally, for any power n of the distance,

$$\left[n + 1 \right] V = \Sigma \left[m \cdot r^{n+1} \right] = \Sigma \left[m \left[(x-a)^2 + (y-b)^2 + (z-c)^2 \right]^{\frac{n+1}{2}} \right],$$

where abc , $a'b'c'$, &c., are the co-ordinates of m , m' , &c.; therefore, performing the several differentiations, making the several substitutions, and arranging the several results, we have, for the function in question, the value

$$\Sigma \left[m r^{n-3} \{ [(x-a)^2 + (y-b)^2 + (z-c)^2] \cdot [\xi^2 + \eta^2 + \zeta^2] + [n-1] \cdot [(x-a)\xi + (y-b)\eta + (z-c)\zeta]^2 \} \right],$$

or, as it may be written more shortly,

$$\Sigma \left[m r^{n-3} \{ r^2 \rho^2 + (n-1) r^2 \rho^2 \cos^2 \theta \} \right],$$

where ρ is the vector of the displacement, and θ the angle between the directions of r and ρ .

But this manifestly preserves its sign, and is positive, for all values of ρ and θ , when n is positive, and does not preserve the sign at all, as ρ and θ vary, when n is negative; and therefore, &c., as regards the property.

The quadric cone, real or imaginary, whose equation, in rectangular co-ordinates to the position of equilibrium xyz as origin, is

$$A\xi^2 + B\eta^2 + C\zeta^2 + 2F\eta\zeta + 2G\zeta\xi + 2H\xi\eta = 0,$$

where

$$A = \frac{d^2 V}{dx^2}, \text{ \&c.}, \quad F = \frac{d^2 V}{dydz}, \text{ \&c.},$$

evidently divides, in all cases, the space about the point into the two different regions for which the changes in V resulting from the displacement of the particle have opposite signs in the above.

The vector ρ of displacement being supposed constant, the squared reciprocal of any radius of the central quadric

$$A\xi^2 + \text{\&c.} = \rho^2$$

represents, as evidently in all cases, in magnitude and sign, the change in V resulting from the displacement of the particle in its direction.

RICHARD TOWNSEND.

THE SIX CO-ORDINATES OF A RIGHT LINE.

THE object of this paper is to present in what appears to be the most elementary form the conception of the six co-ordinates of a right line referred to the ordinary rectangular axes; and to illustrate by a few simple examples the uses to which those co-ordinates in the form in which they are here expressed may be applied.

1. *Definition of the six co-ordinates of a right line.*

A right line is completely determined if a point on it, and at the same time the direction cosines of the line, be given. In this mode of determination five independent quantities are involved. If, however, in place of the co-ordinates, x, y, z of the point, the functions of them $mz - ny$, $nx - lz$, $ly - mx$ (where l, m, n are the direction cosines of the line) are the given quantities, the line is also fully determined; and here there are involved only four independent quantities, for amongst the six quantities

$$mz - ny, nx - lz, ly - mx, l, m, n,$$

there exist the two relations

$$l(mz - ny) + m(nx - lz) + n(ly - mx) = 0, \quad l^2 + m^2 + n^2 = 1.$$

These are called the six co-ordinates of the line. In what follows we shall represent $mz - ny$, $nx - lz$, $ly - mx$, by the letters a, b, c ; and thus write the co-ordinates of a line in the form $(abclmn)$.

To show that the co-ordinates $(abclmn)$ completely de-

termine the line, we first observe that the quantities $mz - ny$, $nx - lz$, $ly - mx$ have the same values for the co-ordinates x, y, z of *any* point on the line. This appears at once from the equations

$$\frac{x_1 - x_2}{l} = \frac{y_1 - y_2}{m} = \frac{z_1 - z_2}{n},$$

where $x_1, y_1, z_1; x_2, y_2, z_2$ are the co-ordinates of any two points on the line. From the equations

$$mz - ny = a, \quad nx - lz = b, \quad ly - mx = c,$$

we get the three following:—

$$nb - mc = x - l \ (lx + my + nz),$$

$$lc - na = y - m \ (lx + my + nz),$$

$$ma - lb = z - n \ (lx + my + nz).$$

These are true for any point on the line; and for the foot of the perpendicular from the origin we thus find the co-ordinates $nb - mc$, $lc - na$, $ma - lb$. This point is therefore determined; and consequently the line itself.

It may be observed that of the six co-ordinates ($abclmn$) of a given line, the three quantities a, b, c , of linear magnitude, are the co-ordinates of a point on a line through the origin perpendicular to the plane containing the origin and the given line, this point being at a distance from the origin equal to that of the given line.

2. *Relation fulfilled by the co-ordinates of two intersecting right lines.*

When the two lines whose co-ordinates are $(a_1b_1c_1l_1m_1n_1)$, $(a_2b_2c_2l_2m_2n_2)$ have common the finite point x, y, z , we have from the equations

$$a_1 = m_1z - n_1y, \quad b_1 = n_1x - l_1z, \quad c_1 = l_1y - m_1x$$

the following :—

$$l_2 a_1 + m_2 b_1 + n_2 c_1 = \begin{vmatrix} l_2 & m_2 & n_2 \\ l_1 & m_1 & n_1 \\ x & y & z \end{vmatrix};$$

and in like manner,

$$l_1 a_2 + m_1 b_2 + n_1 c_2 = \begin{vmatrix} l_1 & m_1 & n_1 \\ l_2 & m_2 & n_2 \\ x & y & z \end{vmatrix};$$

hence

$$l_1 a_2 + m_1 b_2 + n_1 c_2 + l_2 a_1 + m_2 b_1 + n_2 c_1 = 0.$$

This is the required relation.

3. Locus generated by a moving right line.

The remark above made, that the linear co-ordinates $mz - ny$, &c., are independent of the position of x, y, z on the line, is of importance when we come to the consideration of the loci described by a moving right line. In the simple case of cylindrical surfaces, the condition by which the motion of the right line is restricted furnishes us with an equation

$$F(abclmn) = 0,$$

and we have only to substitute in this for a, b, c the values $mz - ny, nx - lz, ly - mx$, to obtain the equation of the surface. For example, let it be required to find the equation of a cylinder generated by a right line maintaining a constant distance r from the origin. The equation of condition is

$$(nb - mc)^2 + (lc - na)^2 + (ma - lb)^2 = r^2,$$

or

$$a^2 + b^2 + c^2 = r^2,$$

and that of the required surface is consequently

$$(mz - ny)^2 + (nx - lz)^2 + (ly - mx)^2 = r^2.$$

4. *Surface generated by a right line intersecting three given right lines.*

Let the co-ordinates of the three given lines be

$$(a_1b_1c_1l_1m_1n_1), (a_2b_2c_2l_2m_2n_2), (a_3b_3c_3l_3m_3n_3);$$

and those of the moveable line

$$(mz - ny, nx - lz, ly - mx, l, m, n),$$

we have then (§ 2),

$$l_1(mz - ny) + m_1(nx - lz) + n_1(ly - mx) + a_1l + b_1m + c_1n = 0,$$

with two similar equations.

Writing this in the form

$$l(a_1 - m_1z + n_1y) + m(b_1 - n_1x + l_1z) + n(c_1 - l_1y + m_1x) = 0,$$

and writing in a similar manner the two corresponding equations, we find by the elimination of l, m, n the equation of the required surface

$$\begin{vmatrix} a_1 - m_1z + n_1y & b_1 - n_1x + l_1z & c_1 - l_1y + m_1x \\ a_2 - m_2z + n_2y & b_2 - n_2x + l_2z & c_2 - l_2y + m_2x \\ a_3 - m_3z + n_3y & b_3 - n_3x + l_3z & c_3 - l_3y + m_3x \end{vmatrix} = 0.$$

The terms of the third degree in this equation vanish identically; and the resulting equation of the second degree is that of the locus in question.

5. *Equation of the plane through a right line parallel to a second right line, and shortest distance between two given right lines.*

Let the co-ordinates of the two given right lines be

$$(a_1b_1c_1l_1m_1n_1), (a_2b_2c_2l_2m_2n_2).$$

Call these lines for convenience (1) and (2). We write down at once the equation of a plane through (1) parallel

to (2) by expressing the condition that the line whose co-ordinates are

$$(m_2z - n_2y, n_2x - l_2z, l_2y - m_2x, l_2, m_2, n_2)$$

should meet (1).

It is

$$\begin{vmatrix} l_1 & m_1 & n_1 \\ l_2 & m_2 & n_2 \\ x & y & z \end{vmatrix} + l_2a_1 + m_2b_1 + n_2c_1 = 0.$$

The equation of a plane through (2) parallel to (1) is, in a similar manner,

$$\begin{vmatrix} l_2 & m_2 & n_2 \\ l_1 & m_1 & n_1 \\ x & y & z \end{vmatrix} + l_1a_2 + m_1b_2 + n_1c_2 = 0.$$

The shortest distance (δ) between the two given lines is the same as that between these two planes.

Its value is consequently

$$\delta = \frac{l_1a_2 + m_1b_2 + n_1c_2 + l_2a_1 + m_2b_1 + n_2c_1}{\sqrt{(m_1n_2 - m_2n_1)^2 + (n_1l_2 - n_2l_1)^2 + (l_1m_2 - l_2m_1)^2}};$$

or, if we represent by ϕ the angle between the lines,

$$\delta \sin \phi = l_1a_2 + m_1b_2 + n_1c_2 + l_2a_1 + m_2b_1 + n_2c_1.$$

We found in § 2 that when two lines intersect at a finite point, the second member of this equation vanishes. We are now in a position to assert, conversely, that when the condition

$$l_1a_2 + m_1b_2 + n_1c_2 + l_2a_1 + m_2b_1 + n_2c_1 = 0$$

obtains among the co-ordinates of two right lines, these lines must intersect, either at a finite or at an infinitely distant point.

6. *Representation of a generating line of a surface of the second degree by its six co-ordinates.*

Let us examine the locus described by the right line (Al, Bm, Cn, l, m, n) , where A, B, C have given values, and l, m, n are variable. The condition to which these quantities must be subjected in order to represent a right line, *i. e.*,

$$Al^2 + Bm^2 + Cn^2 = 0,$$

expresses the property that every generator of the surface is parallel to an edge of the cone

$$Ax^2 + By^2 + Cz^2 = 0.$$

The equation of the surface is got by eliminating l, m, n from the three equations

$$Al = mz - ny,$$

$$Bm = nx - lz,$$

$$Cn = ly - mx,$$

it is, therefore,

$$\begin{vmatrix} A, -z, & y, \\ z, & B, -x, \\ -y, & x, & C, \end{vmatrix} = 0,$$

or, expanding,

$$Ax^2 + By^2 + Cz^2 + ABC = 0.$$

This is the equation of a quadric referred to its centre. We have thus a simple method of representing the generator of a quadric by its six co-ordinates.

The equation just written is unaltered by changing the signs of A, B , and C ; hence the line whose co-ordinates are $(-Al, -Bm, -Cn, l, m, n)$ lies also on the surface. This line is a generator of the second system. The rela-

tion of § 2 is obviously satisfied, hence a generator of one system intersects all those of the opposite system.

Many of the properties of hyperboloids of one sheet admit of simple treatment by the use of these line co-ordinates.

7. We shall conclude with an example in illustration of the simplification which might be introduced into the notation of Mechanics by the use of the co-ordinates of a line.

Let it be required to prove the well-known theorem that the quantity $L\Sigma X + M\Sigma Y + N\Sigma Z$ is independent of the particular system of rectangular axes. (*See Minchin's Statics*, p. 281).

Suppose any number of forces, P_1, P_2 , &c., to act along the lines $(a_1b_1c_1l_1m_1n_1), (a_2b_2c_2l_2m_2n_2)$, &c., we have then

$$\begin{aligned}\Sigma X &= P_1l_1 + P_2l_2 + P_3l_3 + \dots, \\ L &= P_1a_1 + P_2a_2 + P_3a_3 + \dots;\end{aligned}$$

writing down the corresponding values for M, N , the sums of the moments round the axes of y and z ; and for $\Sigma Y, \Sigma Z$; and multiplying, we find

$$\begin{aligned}L\Sigma X + M\Sigma Y + N\Sigma Z &= P_1^2(l_1a_1 + m_1b_1 + n_1c_1) + P_2^2(l_2a_2 + m_2b_2 + n_2c_2) \\ &+ \dots + P_1P_2(l_1a_2 + m_1b_2 + n_1c_2 + l_2a_1 + m_2b_1 + n_2c_1) + \dots;\end{aligned}$$

the factors on P_1^2, P_2^2 , &c., all vanish; and for those on P_1P_2 , &c., we substitute from § 5. We have then

$$L\Sigma X + M\Sigma Y + N\Sigma Z = \Sigma P_1P_2\delta_{12} \sin \phi_{12},$$

where δ_{12} is the distance, and ϕ_{12} the angle between the lines of action of the forces P_1, P_2 . The theorem is thus proved.

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THE NON-EUCLIDIAN GEOMETRY.

- CAYLEY, . . Sixth Memoir upon Quantics.—*Philosophical Transactions*, vol. 149 (1859).
 KLEIN, . . Ueber die sogenannte nicht Euclidische geometrie.
 —*Mathematische Annalen*, vol. IV., p. 573 (1871).
 LINDEMANN, . Ueber unendlich kleine Bewegungen und über
 Kräftsysteme bei allgemeiner projectivischer
 Massbestimmung.—*Mathematische Annalen*, vol.
 VII., p. 56 (1873).

§ 1. *Introduction.*

THE three works here named are the more conspicuous members of a considerable body of literature in which a remarkable mathematical theory has been developed. The list of writers on the different departments of this theory could be greatly extended, and it would be found to contain the names of many of the most eminent mathematicians, including Gauss, Riemann, Clebsch, and Helmholtz. Although Gauss in one way and Cayley in another are undoubtedly the founders of the Non-Euclidian Geometry, yet it is in Klein's Memoir (cited at the head of this paper) that the systematic development of the theory is to be found. The subject is there treated with singular elegance and completeness, and the memoir contains a most interesting historical sketch of the collateral labours of other mathematicians. The Paper by Lindemann treats of some important applications of the principles laid down by Klein to the development of the conceptions of kinematics and dynamics in Non-Euclidian space.

After studying these memoirs, and endeavouring to understand the interesting theory which they contain, I here attempt to give an elementary account of the subject. I have tried to suppress the subordinate details, and bring out strongly the characteristic features of the theory; nor have I scrupled to modify the demonstrations and arrangement adopted by the authors just named, whenever it seemed that by so doing this object could be better attained.

The subject may be introduced by the following passage quoted from the address of Professor H. J. S. Smith, F. R. S., to the mathematical section of the British Association at Bradford in 1873¹:—

“That Euclid’s treatment of the doctrine of parallels is an example of perfect rigorousness is an assertion which sounds almost paradoxical, but which I nevertheless believe to be true. Euclid has based his theory on an axiom (in the Greek text it is one of the postulates, but the difference for our purpose is immaterial) which, it may be safely said, no unprejudiced mind has ever accepted as self-evident; and this unaxiomatic axiom Euclid has chosen to state without wrapping it up or disguising it, not, for example, in the plausible form in which it has been stated by Playfair, but in its crudest shape, as if to warn his reader that a great assumption was being made. This perfect honesty of logic—this refusal to varnish over a weak point—has had its reward, for it is one of the triumphs of modern geometry to have shown that the eleventh axiom is so far from being an axiom in the sense which we usually attach to the word, that we cannot at this moment be sure whether it is absolutely and rigorously true, or whether it is a very close approximation to the truth. Two of those whose labours have thrown much light on this difficult theory are at present at this Meeting—Professor Cayley, and the distinguished German mathematician, Professor Felix Klein; and I am sure of their adherence when I say that the sagacity and insight of the old geometer are only put in a clearer light by the success which has

¹ See “British Association Reports,” Bradford, 1873, p. 5.

attended the attempt to construct a system of geometry consistent with itself, and not contradicted by experience, upon the assumption of the falsehood of Euclid's eleventh axiom."

§ 2. *Fundamental Principles.*

To take the first step in the exposition of this theory, it is necessary to replace our ordinary conception of distance, or rather of *the mode in which distance is measured* by a more general conception. For this purpose we assume the existence of a certain quadric surface which is called the *fundamental quadric*. By the aid of this quadric and an arbitrary constant c we determine the *generalized distance* (or more briefly the "*distance*") between two points, in accordance with the following definition:—

The "distance" between two points is equal to c times the logarithm of the anharmonic ratio in which the line joining the two points is divided by the fundamental quadric.

It cannot be denied that there *appears* to be something arbitrary in this definition when read for the first time. But as the reader proceeds he will find that it is at all events *plausible*, even though he may not go so far as to agree with those who consider that any other conception of distance is imperfect.

Let us first examine whether this definition will fulfil a few obvious tests which any theory of distance ought to satisfy. If P , Q , R be three collinear points, then, in ordinary measurements, we have obviously

$$PQ + QR = PR.$$

Is this fulfilled in the generalized system of measurement? We shall, for convenience, denote the "distance" between two points, by enclosing the ordinary expression for the distance in brackets, *c.g.*, if PQ be the ordinary distance, then the symbol (PQ) denotes the generalized

“distance.” Let the line PQ cut the fundamental quadric in the *two fundamental points* X, Y , then we have

$$(PQ) = c \log (PX \div PY) - c \log (QX \div QY),$$

$$(QR) = c \log (QX \div QY) - c \log (RX \div RY),$$

$$(PR) = c \log (PX \div PY) - c \log (RX \div RY);$$

whence, as in the ordinary measurement,

$$(PQ) + (QR) = (PR).$$

It is also obvious that

$$(PQ) = - (QP),$$

and that the “distance” between two coincident points is equal to zero.

If m be an integer, then

$$\begin{aligned} 1 &= \cos 2m\pi + i \sin 2m\pi \\ &= \exp. (2im\pi). \end{aligned}$$

Hence, whatever be the value of N , we have

$$N = N \cdot \exp. (2im\pi),$$

and

$$\log N = \log N + 2im\pi.$$

It therefore appears that *the “distance” between two points is indeterminate, and may be augmented by any integral number of the periods, $2ci\pi$.*

It is generally supposed that the constant c is equal to $-i \div 2$, though the case where c is real is equally worthy of attention.

We shall neglect this period for the present, merely reminding the reader of the precisely analogous ambiguity which always affects the ordinary measurement of an angle, where it is well known that an angle is indeterminate to the extent of an integral multiple of 2π .

Let the point P remain fixed, and let the point Q move from an infinitely remote distance (in the ordinary sense) at one end of the line to an infinitely remote distance at the other, it is required to trace the changes undergone by the generalized "distance" (PQ) . If for brevity we make

$$h = c \log (PX \div PY),$$

then we have

$$(PQ) = h - c \log (QX \div QY).$$

If Q be indefinitely far (in the ordinary sense) from the fundamental points, then

$$QX \div QY = 1,$$

and, consequently,

$$(PQ) = h.$$

It thus appears that h is the "distance" from P to the infinity of ordinary measurement.

Let us now suppose that Q approaches P , then the "distance" diminishes from its initial value h until it becomes zero, when Q coincides with P . After Q has passed P , the "distance" becomes negative, and continues to diminish with increasing rapidity until it becomes $-\infty$ at I' . After Q passes Y , and until it reaches X , the "distance" is imaginary. At X the "distance" is $+\infty$, and after Q has passed X , the "distance" diminishes continually towards the limit h , which it attains when Q has again travelled to the infinity of ordinary measurement.

It is thus seen that the "distance" from P to any point between the two fundamental points is imaginary (it being assumed that P itself is not between the two fundamental points). It will usually happen that this imaginary consists of an expression of the form $a \pm ib$, but the "distance" from P to its harmonic conjugate, with respect to the fundamental points, presents a critical case, and is easily seen to be equal to $ci\pi$, so that we have the important result which is thus stated:—*The "distance" from a point to its*

harmonic conjugate with respect to the fundamental points is a constant.

From these considerations it appears that in the generalized method of measuring "distance" there are two points on each straight line (*i.e.*, the two fundamental points) which are at "infinity," that the "distance" between two points which are both between or both not between the two fundamental points is real, and that the "distance" between two points which have one of the two fundamental points between them is imaginary.

It is obvious that if the straight line we have been considering had been a tangent to the fundamental quadric, the two fundamental points on that line would have become coincident. It can be further shown that if these coincident fundamental points constitute that one point at infinity on the straight line, with which every student of modern geometry is familiar, then the generalized method of measuring distances degrades to the ordinary method. For we have

$$\begin{aligned}(PQ) &= c \log (PX \div PY) - c \log (QX \div QY) \\ &= c \log (1 + XY \div PY) - c \log (1 + XY \div QY),\end{aligned}$$

and hence, since XY is evanescent,

$$\begin{aligned}(PQ) &= cXY \div PY - cXY \div QY \\ &= cXY \cdot PQ \div (PY \cdot QY).\end{aligned}$$

Let $P'Q'$ be two other points in the same line, then

$$(PQ) \div (P'Q') = PQ \cdot PY \cdot Q'Y \div (P'Q' \cdot PY \cdot QY).$$

If we make the supposition that the coincident fundamental points are at infinity, measured in the ordinary way, then

$$PY \cdot QY \div PY \cdot QY = 1;$$

whence

$$(PQ) \div (P'Q') = PQ \div P'Q';$$

or the generalized system of measurement coincides with the ordinary system.

§ 3. The "Circle."

A plane cuts the fundamental quadric in a conic section called the *fundamental conic*. The two points in which a straight line in the plane cuts the fundamental conic are the *fundamental points* on the straight line. Thus the generalized system of measurement in the plane is determined by the fundamental conic.

It is evident that all the points in the plane which are at "infinity" (using as before the inverted commas to express that the word is to be used in its generalized sense) must lie upon the fundamental conic, and that the "distance" between two points is imaginary when it is once, and only once, divided by the fundamental conic. In ordinary geometry all the points at infinity in a plane lie upon a straight line. This straight line is the evanescent form of the fundamental conic in non-Euclidian Geometry.

In ordinary geometry we define a circle to be the locus of a point in a plane which is at a constant distance from a fixed point. In the non-Euclidian Geometry we may also define a "circle" to be the locus of a point P , of which the "distance" from a fixed point O remains constant. Let OP intersect the fundamental conic in the two points X, Y ; then the locus required is defined by the condition that the logarithm of the anharmonic ratio of the four points O, P, X, Y is to be constant for all the straight lines which can be drawn through O . It is obvious that the anharmonic ratio must itself be constant; and that, therefore, the problem of finding a non-Euclidian "circle" is reduced to the following geometrical problem:—

Through a fixed point O a straight line OP is drawn, which cuts a given conic in the points X, Y ; determine the locus of P so that the anharmonic ratio (O, P, X, Y) shall remain constant.

This is a well-known problem in conics. We can project the fundamental conic into a circle the centre of which is the projection of O . Remembering also that anharmonic ratios are unaltered by projection, the problem has assumed an exceedingly simple form, which is thus stated:—

On the diameter of a fixed circle a point P' is taken, so that the anharmonic ratio of the four points, consisting of P' , the centre O' , and the two points in which the line $O'P'$ cuts the circle, remains constant. It is required to find the locus of P' .

The locus of P' must, in this reduced case, be a circle concentric with the given circle, for then the lengths of the different segments of the line remaining constant, the anharmonic ratio is obviously constant. The projection of the original locus is, therefore, a circle concentric with the circle which is the projection of the fundamental conic: but two concentric circles are the projections of two conics having double contact, and the centre of the circle is the projection of the pole of the chord of contact: hence we have the following important theorems:—

A conic which has double contact with the fundamental conic is a "circle"; and the "centre" of that "circle" is the pole of the chord of contact.

A system of conics which have double contact with the fundamental conic in the same two points form a system of "concentric circles," and the "centre" of the system is the pole of the chord of contact.

The reader will doubtless remember that he has been accustomed to admit, in ordinary geometry, that *every circle passes through the two imaginary circular points at infinity.*

This is the specialized form of that theorem in the non-Euclidian Geometry, which asserts that *every "circle" has double contact with the fundamental conic*. The two theorems indeed coincide if the fundamental conic degrades to the infinity of ordinary measurement.

A curious and critical case is presented when the chord through O coincides with either of the two tangents which may be drawn from O to the fundamental conic. The two fundamental points then coincide, and hence the "distance" between any two points on a tangent to the fundamental conic is equal to zero.² We have thus the curious result, that in every system of "concentric circles," including even the fundamental conic itself, the two points common to the system of "circles" are at the "distance" zero from the "centre" of the system. In fact, the pair of tangents from the "centre" may be regarded as a conic, having double contact with the fundamental conic, and, therefore, forming one of the "circles" of the concentric system, of which the "radius" is zero.

The reader will at once perceive the analogy to a well-known phenomenon in ordinary geometry. The equation in rectangular co-ordinates

$$x^2 + y^2 = 0$$

denotes *either* a circle, of which the radius is zero, *or* the pair of lines,

$$x \pm iy = 0 :$$

in the latter case we are obliged to admit that the distance of any point on either of these lines from their intersection is equal to zero.

² By attributing an infinite value to c we can have a special system of measurement *in the line*, when the fundamental points coincide; but in the plane

this would have the effect of making every "distance" infinite which was not on a tangent.

Since a line through O is cut harmonically by the fundamental conic and the polar of O , it follows that the "distance" from a pole to any point on its polar is constant, and equal to $ci\pi$. It therefore appears that a "circle," of which the radius is $ci\pi$, is really the polar of the centre, with respect to the fundamental conic.

4. *Displacement.*

When a rigid system is displaced in ordinary geometry, the distance between each pair of the particles of the system remains unaltered. The question then arises as to whether it is possible for a "rigid" system to receive a displacement in non-Euclidian space. For such a "displacement" to be possible, it is necessary and sufficient that the generalized "distance" between *each pair* of the particles, after the "displacement," be equal to what it was before. We shall presently show that a "*displacement*" which fulfils these conditions is possible; but it must be carefully observed that this possibility is a theorem which requires proof, and is so far from being obvious, that it ought rather to be regarded as a remarkable property of the function which we employ for the expression of the generalized distance.

The reader may be tempted to suggest that if the fundamental quadric were moved, *pari passu*, with the "rigid" body, the "distances" of its particles would remain unaltered. A little consideration will show that such a motion of the fundamental quadric is an absurdity. Throughout space there is but a single fundamental quadric, by the aid of which all "distances" are measured. If, therefore, this quadric were to be moved to meet the exigencies of a single "rigid" body, the "distance" between every other pair of particles in the universe would be altered, whether they were in motion or not. This is so absurd that we are obliged to inquire whether the "displacement" of a

"rigid" body cannot be effected on the hypothesis that the position of the fundamental quadric remains unaltered.

Let us suppose that a system consists of n independent particles. In giving this system a "displacement," each of the particles may be moved to an arbitrary position. There are thus $3n$ disposable quantities in the specification of the "displacement." If, however, the system is to be "rigid," the distance between each pair, after the "displacement," must be equal to what it was before. The number of distinct pairs is $(n^2 - n) \div 2$. If n exceeds 7, the number of conditions to be fulfilled exceeds the number of quantities which are disposable. In the ordinary conception of a body, of course n is infinite, and therefore the number of conditions to be fulfilled is infinitely greater than the number of disposable quantities. The "distance" of two points is a function of their co-ordinates, and unless the form of that function be properly chosen, a "displacement" of a "rigid" body would be simply impossible. But *for that particular function* which we have chosen, and which, indeed, includes the function of ordinary geometry, as an extreme case, a "displacement" of a "rigid" body is a possibility. In other words, notwithstanding that n is indefinitely great, it is possible, by the proper use of the $3n$ arbitrary quantities, which specify a displacement, to fulfil the $(n^2 - n) \div 2$ conditions, which express that the "distance" between each pair of particles is the same after the displacement as it was before.

Let us first consider the case of a "rigid" system of collinear points A_1, A_2, A_3 , &c., and examine how this system may be "displaced," so as to occupy the corresponding positions B_1, B_2, B_3 , &c., along the same straight line. As the "distance" between each pair of points is to be the same after the "displacement" as it was before, we must have the general condition

$$(A_m A_n) = (B_m B_n),$$

where A_m, A_n typify any two points of the system which are afterwards transferred to B_m, B_n respectively.

As in the displacement of a rigid row of points in ordinary geometry there is one arbitrary circumstance, viz., the distance through which each of the points is translated, so, in the generalized "displacement" of the series of points, there is one arbitrary circumstance, viz., the "distance" through which one of the points is translated.

Let X, Y be the two fundamental points on the line; then, as we have already seen that the fundamental quadric must remain unaltered, the two fundamental points, being the intersections of the straight line with the fundamental quadric, remain unchanged, notwithstanding any "displacement" of the line along its own direction.

Suppose that by "displacement" the point A is transferred to B , then the selection of B is the only arbitrary circumstance for the point B_n , to which any point A_n is "displaced," is completely defined by the anharmonic equality

$$(XYA_1A_n) = (XYB_1B_n).$$

This equation, in fact, expresses that

$$(A_1A_n) = (B_1B_n).$$

If A_m be "displaced" to B_m by the same transformation, so that

$$(XYA_1A_m) = (XYB_1B_m),$$

then it can be proved, as a property of anharmonic ratios, that

$$(XYA_mA_n) = (XYB_mB_n),$$

or

$$(A_mA_n) = (B_mB_n).$$

It follows that the "displacement" thus effected does not alter the "distance" by which any pair of the particles are

separated, and that, consequently, *the conception of the "displacement" of a rigid linear system is quite compatible with the generalized conception of "distance."*

We are now in a position to vindicate the naturalness of the assumption by which we have chosen the *logarithm* as that function of the anharmonic ratio which is most suitable for the expression of the "distance" between two points. In ordinary measurement we employ a *linear scale* as the instrument for ascertaining the distance by which two points are separated. We shall discard the complication produced by fractional parts, and suppose that the distance to be measured is an integral number of the scale-units. Let P, Q be the two points, the distance between which is to be ascertained. Place the scale so that one of the division-marks coincides with P . If the scale be moved along itself through a length of one scale-unit, then each division-mark in the whole length of the scale occupies the position which was previously filled by the next adjacent division-mark. Suppose that in m steps of this kind the division-mark which was initially on P be transferred to Q , then the distance PQ is said to be equal to m scale-units.

To apply this process or an analogous one to the generalized method of measurement employed in the non-Euclidian Geometry, it is first necessary to construct a scale of equal "distances" in the generalized sense. This scale is constructed by choosing an arbitrary point A_1 , and an arbitrary numerical magnitude λ , and then setting off points A_2, A_3 , &c., A_n , which satisfy the following conditions:

$$A_2X \div A_2Y = \lambda \cdot A_1X \div A_1Y,$$

$$A_3X \div A_3Y = \lambda^2 \cdot A_1X \div A_1Y,$$

$$\text{\&c.} \qquad \qquad \text{\&c.}$$

$$A_nX \div A_nY = \lambda^{n-1} \cdot A_1X \div A_1Y.$$

That this is a scale of equal "distances" is readily shown;

for if A_n, A_{n-1} be any two consecutive division-marks, we have

$$\begin{aligned} (A_n A_{n-1}) &= c \log (A_n X \div A_n Y) - c \log (A_{n-1} X \div A_{n-1} Y) \\ &= c \log \lambda. \end{aligned}$$

As λ is arbitrary, the length of the scale-unit $c \log \lambda$ is arbitrary, and we can thus employ differently graduated scales in the generalized system of measurement, just as we are accustomed to do in the ordinary system.

It must be remembered that *we are only allowed to move the scale, subject to the condition that the two fundamental points thereon shall remain unaltered.* If the reader demurs to this restriction, he must be reminded that even in the displacement of an ordinary scale along itself there is one point thereon (or more properly two coincident points) which are not moved. We allude, of course, to the intersection of the scale with the line at infinity. With the generalized scale one "step" will consist in that linear displacement of all its division-marks, which will bring each division-mark to coincide with the place previously occupied by that next adjacent. Let us suppose that m "steps" of this kind are required, in order to convey to a point Q the division-mark A_n , which was originally coincident with a point P ; then the division-mark A_{m+n} must have been originally at Q . It is, therefore, obvious that if the analogy between the use of the generalized scale and the ordinary scale is to be maintained, the "distance" (PQ) must be m "scale units."

But, from the construction of the scale, we know that if X and Y be the fundamental points,

$$A_n X \div A_n Y = \lambda^{n-1} A_1 X \div A_1 Y,$$

$$A_{m+n} X \div A_{m+n} Y = \lambda^{m+n-1} A_1 X \div A_1 Y,$$

whence λ^m is found to be the anharmonic ratio of the four points

$$A_{m+n}, A_n, X, Y.$$

It therefore appears that (PQ) must be equal to $m c \log \lambda$;

and, as we have seen that the "scale unit" is $c \log \lambda$, we have finally

$$(PQ) = m \text{ "scale units."}$$

In ordinary geometry a plane rigid system can receive a displacement in its plane, and each point in the original system will be transferred to a corresponding point in the displaced system, while the distance between any two points in the original system is equal to the distance between the two corresponding points in the displaced system. The "displacement" of a plane "rigid" system on itself in the non-Euclidian Geometry must fulfil the condition that the generalized "distance" between any two points of the system before the "displacement" shall be equal to their generalized "distance" after the "displacement." It is also necessary that the fundamental conic shall remain unaltered. We shall now show how these conditions can be fulfilled by a certain linear transformation of all the points in the plane.

Let x, y, z be the trilinear co-ordinates of a point in a plane, and suppose that x', y', z' are the co-ordinates of the position to which this point is transferred in accordance with the linear transformation,

$$\begin{aligned} x' &= ax + by + cz, \\ y' &= a'x + b'y + c'z, \\ z' &= a''x + b''y + c''z, \end{aligned}$$

where a, b, c , &c., constants.

There are, in general, three points in the plane which are not displaced by this transformation, for if we assume

$$x' = \rho x; \quad y' = \rho y; \quad z' = \rho z,$$

we have for ρ the cubic equation

$$\begin{vmatrix} a - \rho & b & c \\ a' & b' - \rho & c' \\ a'' & b'' & c'' - \rho \end{vmatrix} = 0.$$

The three values of ρ which satisfy this equation determine the co-ordinates of the three points.

It is natural to take the sides of the triangle formed by these three points as the three lines of reference, in which case, if α, β, γ be constants, the system of equations assume the simple form

$$x' = \alpha x; \quad y' = \beta y; \quad z' = \gamma z.$$

In the first place it is to be observed that collinear points before the transformation are collinear points after the transformation, for the linear equation denoting a straight line

$$px + qy + rz = 0$$

becomes transformed into the linear equation

$$\beta\gamma p x' + \alpha\gamma q y' + \alpha\beta r z' = 0,$$

which of course also denotes a straight line. Not only do four collinear points become transformed into four collinear points, but *the anharmonic ratio of the four original points is equal to the anharmonic ratio of the four points into which they are transformed.*

Let the equations of the lines joining the four points to the vertex x, y of the triangle of reference be

$$x - ky = 0; \quad x - ly = 0; \quad x - my = 0; \quad x - ny = 0;$$

then these four lines become, after transformation,

$$\beta x' - \alpha k y' = 0; \quad \beta x' - \alpha l y' = 0; \quad \beta x' - \alpha m y' = 0; \quad \beta x' - \alpha n y' = 0;$$

but the anharmonic ratio of either of these pencils is

$$(n - l) (m - k) \div (n - m) (l - k).$$

As the four collinear points lay severally on the four rays of the first pencil before the transformation, they will lie on the four corresponding rays after transformation; and from the well-known properties of anharmonic pencils, it follows that the anharmonic ratio of the four collinear points is unaltered by transformation.

In the non-Euclidian Geometry the "distance" between two points depends upon an anharmonic ratio, hence it follows that the distance between *any* two points in the plane will be unaltered by such a linear transformation as that which we have been considering, and consequently *the motion of a plane "rigid" system in non-Euclidian space will be a transformation of this character.*

But this general form of linear transformation must be further specialized, because we require that the fundamental conic shall remain unaltered by the transformation. It is easily seen that the specification of the transformation in its general form requires eight constants, viz., the ratios of the nine quantities $a, b, c, a',$ &c. We may imagine five of these constants to be disposed of by providing that the conic into which the fundamental conic is generally transformed shall coincide with the fundamental conic itself. There will still remain three disposable constants to give variety to the possible "displacements."

Although the fundamental conic will thus cover itself after the transformation, yet it *generally* happens that each point thereon will slide along the conic during the transformation. It is, however, very important to observe that there are two exceptions to this statement.

Let O, A, B, C be four points upon the fundamental conic which by transformation move into the positions O', A', B', C' . If OX be one of the two double rays of the systems OA, OB, OC and OA', OB', OC' , and if we use the ordinary notation for anharmonic pencils, then we have the result

$$O(A, B, C, X) = O(A', B', C', X).$$

But the anharmonic ratio subtended by four points on a conic at any fifth point is constant; whence

$$O(A', B', C', X) = O'(A', B', C', X),$$

and therefore

$$O(A, B, C, X) = O'(A', B', C', X).$$

Suppose that the transformation moved the point X to X' , then, since the anharmonic ratio of a pencil is unaltered by transformation, we have

$$O(A, B, C, X) = O'(A', B', C', X');$$

whence

$$O'(A', B', C', X) = O'(A', B', C', X');$$

but this can only be true if the rays $O'X$ and $O'X'$ are coincident, in which case X and X' are coincident; whence it follows that the point X has remained unaltered notwithstanding the transformation. Similar reasoning applies to the point Y defined by the other double ray, and hence we have the following theorem:—

In that linear transformation of the points of a plane which constitutes a generalized movement, there are two points upon the fundamental conic which remain unchanged.

It is also evident that in general *only* two points on the fundamental conic remain fixed, for if a third point were fixed, then *every* point on the conic would be fixed.

It also follows that *the tangents to the fundamental conic at the two points X and Y , as well as the chord of contact, must remain unaltered.* These two tangents and their chord of contact must therefore form the triangle of reference to which we were previously conducted by the general theory of this transformation.

If we denote the two tangents by $x = 0$ and $y = 0$, respectively, and the chord of contact by $z = 0$, the equation of the fundamental conic is

$$xy - k^2z^2.$$

Transforming this equation by the substitution

$$x' = ax; y' = \beta y; z' = \gamma z,$$

the equation of the conic becomes

$$\gamma^2 x' y' - k^2 a \beta z^2 = 0,$$

and as this conic is to remain unaltered, we must have the following condition fulfilled :—

$$a\beta = \gamma^2.$$

It is very remarkable that the fundamental conic is found to be only a single member of a family of conics, each of which remains unaltered by the transformation. In fact any “circle” of which the intersection of the two tangents is the “centre” has for its equation

$$xy - h^2 z^2 = 0;$$

and provided that $a\beta = \gamma^2$, then, whatever h may be, this “circle” remains unaltered by the transformation. Hence we have the following remarkable theorem :—

When a plane “rigid” system is “displaced” upon itself, there is one point, O, of the system which remains unaltered, and all the “circles” which have O as their “centre” remain unaltered also.

It is quite natural to speak of this motion as a “rotation,” and thus we may assert the truth in the non-Euclidian Geometry of the well-known theorem in ordinary geometry, that

Every “displacement” of a plane upon itself could have been produced by a “rotation” of the plane around a certain point in the plane.

It appears that, notwithstanding the “rotation” of the plane around O , the two tangents from O to the fundamental conic, and also their chord of intersection, or the polar of O , remain unaltered. We might indeed have anticipated the latter result; because the polar is really a “circle” of which the “radius” is $ci\pi$. As each point on the polar of O is displaced along the polar, we would, in ordinary geometry, call this motion a *translation* parallel to the polar;

and, with a certain caution, we may speak of the generalized motion we have been considering as a "translation" also. There is, however, this difference :—In an ordinary translation all the points move in parallel lines ; but this is *not the case* in the more general description of translation now under consideration.

It appears, therefore, that in the sense now attributed to the words "rotation" and "translation," a "*rotation*" round a point is identical with a "*translation*" along the polar of the point.

The reader of ordinary geometry has, doubtless, often had occasion to regard a translation of a plane figure as equivalent to a rotation about an infinitely distant point. This can only be regarded as a "survival" of the very remarkable property at which we have just arrived. If the fundamental conic be degraded to the ordinary infinity, then the general property degrades to the attenuated form with which we have long been familiar.

Another point in which the non-Euclidian Geometry throws light on the ordinary geometry must be here alluded to. We have seen that the two tangents from O to the fundamental conic remain unchanged during the "rotation" of the plane round O . It certainly does seem paradoxical to assert that a plane and all it contains are "rotated" about a point, and that, nevertheless, this operation does not alter the position of a certain pair of lines in the plane which pass through the point. But have we not precisely the same difficulty in ordinary geometry? Let us suppose that a plane pencil of rays is rotated through an angle θ about the origin. Then a line through the origin, whose equation before the rotation was

$$x + hy = 0,$$

becomes, after the rotation,

$$x \cos \theta + y \sin \theta + h(y \cos \theta - x \sin \theta) = 0.$$

The lines represented by these equations are of course in general different; but they will be the same if

$$h(\cos \theta - h \sin \theta) = \sin \theta + h \cos \theta,$$

or

$$1 + h^2 = 0.$$

It follows that, even in ordinary geometry, the two lines

$$x \pm iy = 0$$

remain unaltered, notwithstanding the rotation of the plane which contains them around their intersection. The two lines here referred to are of course those which are drawn through the two circular points at infinity. This paradox is therefore only a degraded form of the property of the tangents to the fundamental conic.

If a "rigid" plane system receive an infinitely small "displacement," then each point P in the plane commences to "move" in a certain direction. It is required to find that direction. The "displacement" being given, the point O is determined by "rotation," around which the given displacement could have been effected. If a conic be described which passes through P , and has double contact with the fundamental conic at the points where it is cut by the polar of O , then the tangent drawn at P is the required direction. The following theorem will now be proved:—

If a rigid plane system be "rotated" around a point O , then each point T will commence to move in the direction found by joining T to the pole of the line OT with respect to the fundamental conic.

Let the line OT cut the fundamental conic in the points XY , and let another line through O , exceedingly close to OT , cut the fundamental conic in $X'Y'$. The chords XX' and YY' may be considered to be tangents to the fundamental conic which intersect at a point P , which is of

course the pole of OT . Let PT intersect $OX'Y'$ in T' . Then, in consequence of the anharmonic pencil which has its vertex at P , we must have

$$(O, T, X, Y) = (O, T', X', Y').$$

Whence $(OT) = (OT')$; and, therefore, T' is the point to which T is moved; but T' is on the line drawn from T to the pole of OT , and, therefore, the theorem has been proved.

If a plane receive two small "rotations" round two points, then the total "rotation" produced could have been produced by a single "rotation" about a certain point in the line joining the two points.

Let A, B be the two points, and P the pole of the line AB , then a "rotation" round A will displace B along the line PB to an adjacent point B' . The "rotation" around B will displace A to A' along the line PA ; but if $A'B'$ intersects AB in O , then a single "rotation" about O would have effected the required displacements of A and B , and, therefore, of the whole line. For as the point O in the line AB could only move by displacement into the line $A'B'$, while it can also only move in the direction OP , it must obviously remain unaltered.

§ 5. *Measurement of Angles.*

We are now in a position to inquire how the magnitude of an "angle" is to be expressed in the non-Euclidian Geometry. Our definition of the magnitude of an angle must be made consistent with the supposition that when the angle is carried round by "rotation" about the vertex the "magnitude" shall remain unaltered. As anharmonic ratios are unaltered by the rotation, it follows that the anharmonic ratio of the pencil formed by the two legs of the angle and the two tangents to the fundamental conic

must remain unaltered. Remembering that the tangents do not move by the rotation, it is natural to choose a function of this anharmonic ratio as the appropriate measure of an "angle." The question still remains as to what function should be chosen. The student of ordinary geometry is, doubtless, aware that the angle between two lines multiplied into $2i$ is equal to the logarithm of the anharmonic ratio of the pencil formed by joining the intersection of the two lines to the two imaginary circular points at infinity. This consideration suggests that *the "angle" between two lines may be appropriately measured in the non-Euclidian Geometry by the logarithm of the anharmonic ratio of the pencil formed by the two legs of the angle, and the two tangents drawn from their point of intersection to the fundamental conic.* There is also a convenience in assuming the angle to be actually *equal* to c times the logarithm of the anharmonic ratio, where c is the same constant which is employed in the expression of the "distance." In this case the "angle" between the lines is, by a well-known theorem, equal to the "distance" between their poles.

It will now be obvious that, *however the angle be situated, its "magnitude" is unaltered by a displacement of the plane:* for as we have already seen that the "displacement" does not alter the "distance" between the poles of the two lines forming the angle, it follows that the magnitude of the angle itself is unaltered.

Just as in the measurement of "distance," we find *a pair of fundamental points on each straight line*, so in the measurement of angles we find *a pair of fundamental rays in each plane pencil.* These rays are the two tangents from the vertex of the pencil to the fundamental conic. In ordinary geometry the two fundamental points on each straight line coalesce into the single point at infinity; but it is exceedingly important to observe that *even in ordinary*

geometry the two fundamental rays in each pencil do not coincide. It should also be observed that in the degraded circumstances of ordinary geometry it would be impracticable to employ the *same* constant c for the purposes of both linear and angular measurement.

In ordinary geometry two lines are at right angles when c times the logarithm of the anharmonic ratio of the pencil which they form with the two lines drawn from their intersection to the circular points at infinity is equal to $c i \pi$. But this quantity is equal to the "distance" from any point to a point on its polar with respect to the fundamental conic; it is, therefore, equal to the "angle" which a line drawn through the pole makes with the polar. We therefore assert, in the non-Euclidian Geometry, that—

Any straight line drawn through the pole cuts the polar at "right angles."

This statement is equivalent to the following, which may be regarded as the definition of a "right angle" in the non-Euclidian Geometry:—

If two corresponding legs of an harmonic pencil touch the fundamental conic, then the two other legs are at "right angles."

We also see that all the "perpendiculars" to a given line pass through a point, *i.e.*, the pole of the given line, and from a given point a "perpendicular" can be drawn to a given line by joining the point to the pole of the line.

§ 6. *Parallel Lines.*

We have hitherto made little or no reference to the subject of *Parallel lines*. It will now be necessary to show the bearings of the generalised system of measurement on the Theory of Parallels, and to point out the connexion of this system with Euclid's eleventh axiom.

The student of modern geometry is accustomed to think of parallel lines as lines which intersect at infinity,

or as lines whose angle of inclination is zero. We shall not even ask him to depart from the language to which he has been accustomed. In the non-Euclidian Geometry lines which intersect at "infinity" are also called "parallel"; but as all points which lie at infinity are upon the fundamental conic, we may define "parallel" lines *in the plane* as follows:—

Two straight lines which intersect upon the fundamental conic are "parallel."

We are now enabled to see how the non-Euclidian Geometry differs from that of Euclid, and to observe that the sole point of departure is in connexion with the celebrated eleventh axiom. It is, for our purpose, immaterial whether we speak of the axiom itself, or of the propositions derived therefrom, in combination with the other axioms concerning which there is no question raised. One of the most immediate consequences of the eleventh axiom is that only *one* parallel to a given line can be drawn through a given point. But in the non-Euclidian Geometry the line cuts the fundamental conic in two points, and *either* of these intersections joined to the given point must be regarded as a "parallel" to the given line. It may, of course, happen that the given line touches the fundamental conic, and in this case the two parallels coincide, and we are at one with Euclid. It is important to observe, that this is the case in which the two fundamental points coincide, and in which we have already seen that the generalised system of measurement degrades to the ordinary system.

The celebrated proposition, that the three angles of a triangle are equal to two right angles, is also founded upon the eleventh axiom. *In the non-Euclidian Geometry it is not true that the three angles of a triangle are equal to the right angles.* In fact, if we take an extreme case, and suppose the three vertices of the triangle to lie upon the fun-

damental conic, each of the three angles, and therefore their sum, is equal to zero.

§ 7. *Velocity and Force.*

In ordinary geometry the velocity of a particle which is moving uniformly is equal to the distance traversed in one unit of time. The same definition may be used in non-Euclidian Geometry, only observing that the "distance" is to be measured in accordance with the generalized method.

A point which is moving "uniformly" in the generalized sense along a right line will never attain either of the fundamental points, for since these points are at an infinite distance, an infinite time would be required.

Nor is the conception of "force" wanting in the non-Euclidian Geometry. We may define a "constant force" as that which produces "equal increments of velocity" in equal times. It is most interesting to observe that the various laws of the composition and resolution of forces with which we are familiar in ordinary dynamics have their analogues in the non-Euclidian space. It would, however, lead us too far to enter into this branch of our subject. We refer the inquiring reader to Lindemann's paper, where he will find an account of the subject founded mainly upon the theory of the Linear Complex.

One point, however, may be mentioned. It is often convenient in ordinary statics to think of a couple as a force at an infinite distance. This is another "survival" of a much more general conception, which is presented in the non-Euclidian Geometry. In the latter case we find that a "force" and a "couple" are so correlated that a "force" along a line is equivalent to a "couple" around the pole of the line.

§ 8. *Non-Euclidian Geometry of Three Dimensions.*

A "sphere," in the generalised system of measurement, is the locus of a point which moves at a constant "distance" from a fixed point. It can therefore be easily shown, from what we have already seen in the case of the plane, that a "sphere" is a quadric which touches the fundamental quadric along its intersection with the polar plane of the centre of the "sphere."

We can "displace" a rigid system in non-Euclidian space so that the generalised "distance" between each pair of points after the displacement is the same as before. This "displacement" is effected by a linear transformation analogous to that which we adopted in the plane. Let x, y, z, w be the co-ordinates of a point, and by linear transformation this point is changed into x', y', z', w' , so that $a_1, b_1, \&c.$, being constants, we have

$$x' = a_1x + b_1y + c_1z + d_1w$$

$$y' = a_2x + b_2y + c_2z + d_2w$$

$$z' = a_3x + b_3y + c_3z + d_3w$$

$$w' = a_4x + b_4y + c_4z + d_4w$$

In the first place, we observe that this transformation fails to disturb four points; for if

$$x' = \lambda x; \quad y' = \lambda y; \quad z' = \lambda z; \quad w' = \lambda w,$$

then we obtain an equation of the fourth degree for λ ; the four roots of this equation determine the co-ordinates of the four points which are unaltered.

It is natural to adopt the faces of the tetrahedron, of which these four points are the vertices, as the planes of reference, in which case the formulæ for the transformation become

$$x' = \alpha x; \quad y' = \beta y; \quad z' = \gamma z; \quad w' = \delta w.$$

From these equations it is easy to show that collinear points before the displacement are collinear after, and that the anharmonic ratio of a plane pencil of four rays is also unaltered. Hence a "displacement" of this kind will not alter the anharmonic ratio of four collinear points, and therefore a "rigid" system may be "displaced" in non-Euclidian space without altering the "distances" between any of its particles. We must, of course, also add that the fundamental quadric is to remain unaltered.

A special form of the general "displacement" of a rigid system is presented by the "rotation" of that system round a fixed point O . In that case the point O and its polar plane, as well as the tangent cone from O to the fundamental quadric, must remain unaltered, as must also the "spheres" of which O is the "centre." The points in the polar plane of O must be "displaced" by a "rotation" around some point in the plane. This point will remain unchanged during the "displacement" of the "rigid" system; hence it follows that the line joining this point to O will remain unaltered, and thus we have the following theorem:—

Any displacement of a "rigid system" around a fixed point could have been produced by "rotation" about a certain axis passing through the point.

This theorem is of course very well known in ordinary kinematics.

In discussing the general case of the "displacement" of a "rigid" system in non-Euclidian space, it will simplify matters to suppose that the fundamental quadric has real rectilinear generators; it must, however, be understood that the results are not on that account less general. A "displacement" must not alter the fundamental quadric, and must not deform a straight line; hence it follows that the only effect of a "displacement" upon a generator of the fundamental quadric will be to convey it to a position pre-

viously occupied by a different generator. We shall further suppose that the displacement is such that the two generators to which we have referred belong to the same system (though the other case is one which also demands attention). Let A, B, C, D be four generators of the first system, which by "displacement" are brought to coincide with four other generators, A', B', C', D' . Let X be one generator of the second system which the "displacement" brings to X' . Since the anharmonic ratio of the four points in which four fixed generators of the one system are cut by any generator of the other system is constant, we must have, using an obvious notation for anharmonic ratios,

$$X(A, B, C, D) = X'(A, B, C, D);$$

but since anharmonic ratios are unaltered by "displacement," we have

$$X(A, B, C, D) = X'(A', B', C', D'),$$

whence

$$X'(A, B, C, D) = X'(A', B', C', D').$$

It therefore follows that the anharmonic ratio in which four generators cut a fixed generator X' is equal to the anharmonic ratio in which the four generators after displacement cut the same generator X' .

If P be a generator, which passes through one of the double points on X' , determined by the two systems of points in which X' is cut by the four generators before and after "displacement," we must have

$$X(A, B, C, P) = X'(A', B', C', P);$$

hence we see that the generator P will be unaltered by "displacement." Similar reasoning applies to the generator which passes through the other double point, and of course to a pair of generators of the second system, and hence we have the following remarkable theorem:

In the most general displacement of a "rigid system" in non-Euclidian space, two generators of each of the systems on the fundamental quadric remain unaltered.

These four fixed generators are edges of a tetrahedron. Denoting the four faces of this tetrahedron by the equations

$$x = 0; y = 0; z = 0; w = 0,$$

the equation of the fundamental quadric is

$$xz + h^2 yw = 0.$$

If this quadric be unaltered by the transformation

$$x' = \alpha x; y' = \beta y; z' = \gamma z; w' = \delta w,$$

then we must have

$$\alpha\gamma = \beta\delta;$$

when this condition is satisfied, then whatever h may be every quadric of the family

$$xz + h^2 yw = 0$$

will remain unaltered.

The family of quadrics here indicated are analogous to the right circular cylinders, which have for a common axis the screw, along which any displacement of a rigid body in ordinary space may be effected.

The two lines

$$x = 0; z = 0$$

and

$$y = 0; w = 0$$

are conjugate polars with respect to the fundamental quadric, and both these lines are unaltered by the displacement. Hence we see that:—

In any displacement of a "rigid system" there are two right lines which remain unaltered, and these lines are conjugate polars with respect to the fundamental quadric.

Since the pole of a plane through one of these lines lies on the other line, it appears that

A rotation of a "rigid system" about a line is identical with a translation of the system along its conjugate polar.

Hence, more generally—

A screwing movement of a "rigid system" about a straight line is identical with a suitable screwing movement about its conjugate polar.

We thus see that in non-Euclidian space it is possible to determine *two* "screws" by a twist about *either* of which a given "displacement" of a rigid system could be effected. In ordinary space the corresponding screw is unique.

§ 9. *Applications to the "Theory of Screws."*

The principles of non-Euclidian Geometry are very intimately connected with that chapter in Dynamics which I have ventured to call the Theory of Screws. I shall here endeavour to sketch so much of the subject as will include the fundamental principles of the composition of "twists." In the discussion now commencing, it must be understood that *when displacements are spoken of, the magnitudes of these displacements are always indefinitely small.* Thus, although in the "rotation" of a body around an axis each point of the body really describes a curved path, yet when the amplitude of the rotation is exceedingly small, each point may be considered to have moved simply in the tangent to its trajectory.

Let A denote the axis about which a body is "rotated," and let P be a point of that body, then, in consequence of a small "rotation" the point P is moved from its original position P to a new position P' . It is required to determine P' . This problem may be solved by the consideration that the "distance" from P to *any* arbitrary point T on the axis A must be the same as the "distance" from

P' to T . Draw a plane S through A and P , and draw the tangent cone to the fundamental quadric along its intersection with S . The point O , which is the vertex of this cone, is of course the pole of the plane S . The indefinitely small "rotation" will move the plane S to an indefinitely close position S' , the two planes S and S' of course intersecting in the axis A . If the line OP cut the plane S' in P' , then P' is the position to which P will be moved by the "rotation." For let TP cut the fundamental quadric in X, Y , and let TP' cut it in X', Y' , then the points X, Y, X', Y' , may all be regarded as lying on the tangent cone, and consequently the anharmonic pencil. $O(T, P, X, Y)$ is cut by TP' in the four points T, P', X', Y' , or

$$(T, P, X, Y) = (T, P', X', Y').$$

We therefore deduce the following important theorem :

If a "rigid body" be rotated about an axis A , then any point P of the body commences to move in the direction determined by joining P to the pole of the plane containing A and P with regard to the fundamental quadric.

In the case of the rotation of a body around an axis in ordinary space, each particle of the body lying in a plane passing through the axis commences to move in a direction perpendicular to its plane. If we remember the definition of a right angle in non-Euclidian space, this theorem is seen to be only the vanishing form of the general theorem just demonstrated.

If a pencil of planes be drawn through the axis A , the poles of all those planes will lie upon an axis A' , which is the conjugate polar of A ; we have therefore the following theorem :—

If a "rigid body" be rotated about an axis A , then every particle of the body will commence to "move" in a direction which intersects the conjugate polar of A .

Since "rotation" about an axis is equivalent to "translation" along its conjugate polar, we see that

"In the translation of a "rigid body" every particle of the body commences to move in a direction which intersects the axis of translation."

The most general form of a "displacement" of a rigid body is a "rotation" about an axis coupled by a "rotation" about its conjugate polar. Following the language of the *Theory of Screws*, we may call the joint result of these two "rotations" a "twist," and the "pitch" of the "twist" is the ratio of the amplitudes of the two "rotations." The "amplitude" of the "twist" is the magnitude of the "rotation" about one of the conjugate polars which, as the "pitch" is supposed to be known, determines the "amplitude" of the other "rotation."

If A, B be a pair of axes, and A', B' be their conjugate polars, then "rotations" around A and A' will constitute one "twist," and "rotations" around B and B' will constitute another, and in each case the "pitches" and the "amplitudes" are supposed to be given. It is required to determine the single pair of conjugate axes C, C' on which suitable "rotations" will constitute a "twist" equivalent to the two given "twists."

Draw the two common transversals X, X' which intersect the four rays A, B, A', B' , then X, X' are themselves "conjugate polars" to the fundamental quadric. For the four planes XA, XB, XA', XB' must have collinear poles which lie upon the lines A', B', A, B respectively; but as there are in general only two common transversals to A, B, A', B' these poles must be their intersections with X' . As the four planes through X have their poles on X' , it follows that X and X' are conjugate polars.

We may remark that a transversal drawn across two conjugate polars cuts each of them at "right angles"; that the "distance" from any point on an axis to any point on

its conjugate polar is constant, and is equal to a "right angle." It also appears that two "common perpendiculars" can be drawn to a pair of rays A, B . These are the two common transversals which can be drawn across the two rays and their conjugate polars A', B' . These theorems sound somewhat startling, but their vestiges are not wanting in ordinary geometry if we reflect that the conjugate polar of a ray in ordinary space is the line at infinity which is perpendicular to the ray.

We now proceed to consider the effect produced on the four points a, b, a', b' by a twist about A, A' (Fig. 1). A "rotation" around A will not alter the position of any point on that axis, and therefore a will remain unaltered. Every other point of the line X will start off towards the pole of the plane containing A and X : this point is of course the intersection of A' and X' that is the point a'_1 . The "rotation" around A has thus the effect of causing all points on X to start off towards the point a'_1 .

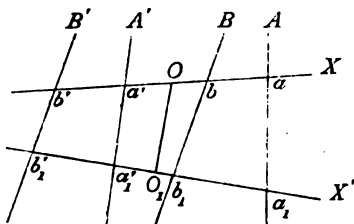


Fig. 1.

Similarly the "rotation" around the ray A' will have the effect of starting off every point on the ray X to move towards the point a_1 . The joint effect of the two "rotations" constituting the "twist" A, A' will therefore be to move any arbitrary point O on X along Oa_1 , and also along Oa'_1 . These motions compounded together will have the effect of "displacing" O in the plane which contains X' , and along a direction which we may represent as OO_1 .

Take any four points on X ; these points will start off towards the four corresponding points on X' ; but four collinear points are collinear after the "displacement." It therefore follows that the four lines, of which OO_1 is a type,

must be intersected by a common transversal in the neighbourhood of X , as well as by X and X' . But when four straight lines have three common transversals they must be generators of an hyperboloid; whence we have the following important theorem:—

If two conjugate polars X and X' be drawn to intersect two other conjugate polars A and A' , then a small “twist,” produced by “rotations” about A and A' , will displace all the points on X along the generators of an hyperboloid towards corresponding points on X' .

A very important consequence follows from this theorem. Since the anharmonic ratio in which four generators of one system on an hyperboloid intersect a generator of the other system is constant, we see that, if four points P, Q, R, S , on X commence to move towards points P', Q', R', S' , on X' , the anharmonic ratios of these two sets of points are equal.

From this we can deduce the joint effect of the two “twists” upon the points which lie along the line X , and show, in the first place, that there are two points on X which are critically circumstanced.

Suppose that in consequence of the first twist three arbitrary points, P, Q, R , on X would be moved in the direction of P', Q', R' , respectively (Fig. 2), while by the second twist the same three points would be moved towards P'', Q'', R'' . Let L', M' be the double points of the system P', Q', R' , and P'', Q'', R'' , and take L, M on X so that the following anharmonic equalities are fulfilled:

$$(P, Q, R, L) = (P', Q', R', L'),$$

$$(P, Q, R, M) = (P', Q', R', M').$$

The points L, M thus determined on the ray X enjoy a remarkable property. It follows immediately, from the anharmonic equalities just written, that the point L will be

displaced along the ray LL' , whether the twist be about A, A' or whether it be about B, B' . In the same way the point M can only move in the direction MM' , whether the twist is about AA' or BB' .

The *direction* in which a point on X is "displaced" depends upon the "pitch" of the twist, and not upon its "amplitude." The latter only comes into consideration when the *amount* of the displacement is concerned. It thus appears that the determination of the points L and M is quite independent of the amplitudes.

When the amplitudes of the two twists are also given, then we know the actual distances, LL'' and MM'' (Fig. 3), to which the points at L and M will be conveyed by the operation of the two twists. This will enable us to find that pair of conjugate polars CC_1 and C_1C_1' about which a twist will

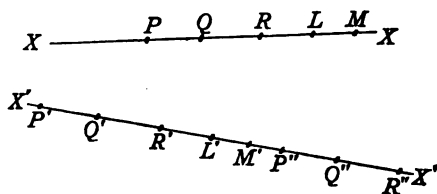


Fig. 2.

be equivalent to the two given twists. Let the lines LM and $L'M'$ cut the fundamental quadric in the points UV and $U'V'$ respectively; then, since CC' and C_1C_1' are conjugate polars, UV and $U'V'$ will be cut harmonically by CC_1 and $C'C_1'$, respectively.

The "rotation" about CC' will move C_1 towards C_1' , while that about C_1C_1' will move C towards C' . The two rotations together must convey L to L'' and M to M'' . It follows that CC' and C_1C_1' must be intersected by the line $L''M''$; and that, consequently, the hyperboloid defined by having the three known lines $LM, L''M'', L'M'$ as three generators, must have the required lines CC_1 and C_1C_1' as generators belonging to the other system. These lines are easily found. Through U and V draw lines UU_1 and VV_1 ,

which intersect both $L'M'$ and $L''M''$: these lines will be generators of the hyperboloid, and therefore (Fig. 3)

$$(C, U, C_1, V) = (C', U_1, C'_1, V_1).$$

We thus have C' and C'_1 defined immediately as the points which divide both U_1V_1 and $U'V'$ harmonically. It is then only necessary to draw $C'C$ and C'_1C_1 to intersect $L''M''$ and LM , and the problem has been solved.

If the "amplitudes" of the original "twists" were not known, though the

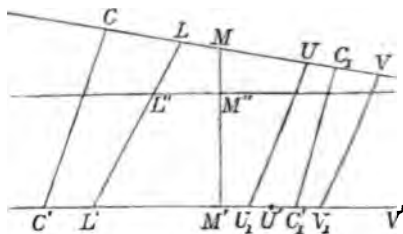


Fig. 3.

"pitches" are given, then we only know that L and M will be displaced along the lines LL' and MM' respectively; but we do not know the precise distances which they will attain. In this case we cannot of course find the lines CC' and $C_1C'_1$, but we can show that they are confined to a certain ruled surface, the discovery of which is due to Lindemann.

Recalling for a moment the analogous question in ordinary space, we find it to be as follows:—Given two screws, determine the locus of the screw about which a twist will be equivalent to the effect of twists about the given screws. The locus is a ruled conoidal surface of the third degree, called the cylindroid. This surface is really only the degraded form of Lindemann's surface of the fourth degree, with two double lines, which is presented in the solution of the analogous problem in non-Euclidian Geometry.

To construct the latter surface we proceed as follows:—Take *any* point C on LM , then of course its harmonic conjugate C_1 is determined at once. The points $C'C'_1$ are to

be found from the condition that they are harmonic conjugates, with respect to $U'V'$, and that they fulfil the anharmonic equality—

$$(C, L, M, C_1) = (C', L', M', C'_1).$$

This problem has two solutions, and, therefore, *two generators of the required surface can be drawn through any point C on one of the two double lines*. It can be shown that this leads to a surface of the fourth degree, which reduces to the cylindroid when the two double lines are at right angles and one of them is the line at infinity. The equation of the cylindroid

$$z(x^2 + y^2) - 2mxy = 0$$

can be thus obtained without difficulty.

§ 10. *Parallel Lines in Space of Three Dimensions.*

This sketch would be incomplete were it to be terminated without some account of the remarkable contributions which have been made to the Theory of non-Euclidian Geometry by the late Professor Clifford.* His remarks on the subject will be found in a memoir entitled “*Biquaternions*,” published in the *Proceedings of the London Mathematical Society*, 1873, p. 381.

We have explained that in the plane two “parallel” lines intersect upon the fundamental conic. In a certain sense also we may consider two lines in space of three dimensions to be parallel whenever they intersect upon the

* During the meeting of the British Association at Bradford in 1873, I had the privilege of being present for some hours at a conversation between Professor Klein and Professor Clifford, in which for the first time I heard of the non-Euclidian Geometry. Clifford's

Paper, above referred to, was discussed *inter alia*, and the intense interest which I felt in the subject itself, as well as the genius with which I heard it expounded, have impressed the details of that conversation indelibly on my memory.

fundamental quadric. This is the view of parallel lines to which we are conducted by simply generalizing the property that two parallel lines intersect at infinity. But we can take a different definition of two parallel lines. Let us, for example, call two lines parallel when they admit of an indefinitely large number of common perpendiculars. It is exceedingly interesting to observe that when this condition is fulfilled in non-Euclidian space, the "parallel" lines so obtained enjoy many of the properties of ordinary parallel lines. The perpendicular "distance" between such a pair of parallels is constant, and the "angles" which they make with any common transversal are equal.

It will be shown in a moment that any pair of straight lines which intersect the same two generators of the same system on the fundamental quadric are "parallel" in this new sense; but we shall first forestall the objections which may be raised as to the apparent ambiguity involved in this use of the word parallel. The fact is that in the degraded circumstances of ordinary geometry, two quite different conceptions have become confused. A pair of lines which intersect on the fundamental quadric, and a pair of lines which intersect the same pair of generators of the fundamental quadric, are totally distinct conceptions; but when the fundamental quadric degrades to the ordinary infinity, then the conceptions coalesce, and each of them is merely a pair of parallel lines in the ordinary sense of the word. The ordinary properties of parallel lines have all their analogues in non-Euclidian space; but these analogues are distributed between the two original sources of parallels. Clifford proposes to retain the word "parallel" in non-Euclidian space, for that conception which exhibits the analogues of the *more remarkable* properties of ordinary parallel lines, and defines as follows:—

Straight lines which intersect the same two generators of the same system on the fundamental quadric are parallel.

As this definition is, of course, inapplicable in the plane, it seems in this case unobjectionable to apply the word parallel to the other alternative, as we have already done.

Let X and Y be two rectilinear generators of the fundamental quadric belonging to the same system, and let A and B be two straight lines which intersect both X and Y . Since AX and AY are tangent planes, their poles must lie on X and Y respectively, and therefore A' (and B'), the polar of A (and B), must intersect both X and Y . The anharmonic ratio of the four points in which X cuts A , B , A' , B' , respectively, is equal to that of the tangent planes drawn at the points where X cuts A' , B' , A , B , respectively; and as all these tangent planes contain X , their anharmonic ratio must be equal to that in which they are cut by the line Y . It hence appears that the lines X and Y are divided equianharmonically by the four rays, A , B , A' , B' , and therefore the four rays A , B , A' , B' must be all generators of the same system on an hyperboloid. An infinite number of transversals can therefore be drawn to intersect these four rays, that is to say, an infinite number of common "perpendiculars" can be drawn to the two rays, A and B .

If two hyperboloids have two common generators X and Y belonging to the same system, they must also have two other common generators belonging to the other system; for let P , Q , be generators on each of the hyperboloids respectively, belonging to the X , Y system, then two common transversals can be drawn to the four lines P , Q , X , Y , and these must be generators of both hyperboloids. As the hyperboloid, defined by A , B , A' , B' , has the two generators X and Y in common with the fundamental quadric, it must also have two other generators X' and Y' in common with the fundamental quadric. It therefore appears that all the common "perpendiculars" to

the two lines A and B will be themselves parallel; and as the anharmonic ratio in which each of these perpendiculars is divided by A, B, X', Y' is constant, it appears that the distance intercepted on each of the "perpendiculars" between the two parallel lines is constant also.

Through any point two parallels can be drawn to a given line, for we may draw through the point two straight lines, one of which intersects two generators of the first system, and the other two generators of the second system. Clifford distinguishes these as right and left parallels, respectively. The two parallels to a line L , which can be drawn through a point P , coincide when P lies on the conjugate polar of L .

Clifford has also pointed out the very remarkable result that a twist about a screw, of which the pitch is unity, has simply the effect of translating all points of the body through equal distances along parallel lines. This will now be proved. Let A, A' be the pair of conjugate polars appropriate to the twist, and let P be an arbitrary point of the body. Draw through P a transversal PQR , intersecting A and A' . Then $P'R'$, the polar of PR , also intersects A and A' . Draw a

plane through A of which R is the pole: the rotation about A will move this plane so that its pole is transferred to R' . Draw through A' a plane of which Q is the pole, and let the rotation around A' move Q to Q_1 , the distances RR_1 and QQ_1 must be equal, because

the rotations about A and A' are equal, as the pitch is unity. As A and A' are conjugate polars, the angles at Q, Q_1, R, R_1 , are all right angles, and consequently $P_1Q_1R_1$

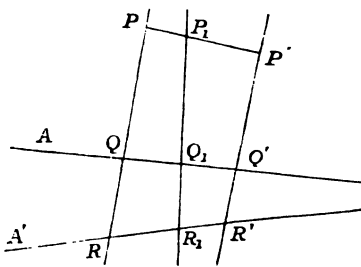


Fig. 4.

must be parallel to PQR . The effect of the twist will therefore be to move the line PQR to the parallel position $P_1Q_1R_1$. The point P must, however, move so that it intersects its conjugate polar $P'Q'R'$. The line PP_1 is therefore perpendicular to PQR , and parallel to A and A' . The distance (PP_1) is also equal to (QQ_1) and (RR_1) , and is therefore simply equal to the angle of rotation. We thus find that any arbitrary point P is transferred in a direction parallel to the conjugate polars of the original twist, and through an angle equal to the amplitude of the twist. It is obvious that in this case the axes of the twist are indeterminate, as any line of the parallel system with its conjugate polar will fulfil the condition.

To enter into further developments given to the subject by Clifford would extend this Paper to an unreasonable length; but I hope the account I have given may be of some service in attracting the attention of mathematical students to a very promising field of investigation.

ROBERT S. BALL.

MATHEMATICAL PRINCIPLES OF TIDAL THEORY* AND OBSERVATION.

PROPOSITION I. (PROBLEM.)

It is required to find mathematical expressions for the disturbing force of the moon upon the ocean.

In the accompanying Figure (1), let C be the centre of the earth,

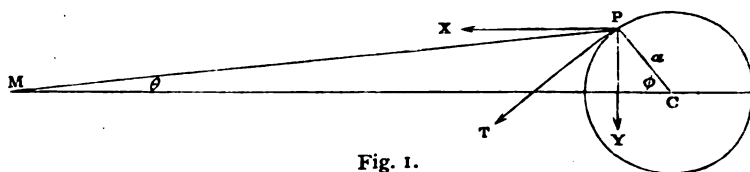


Fig. 1.

M the moon, and P any point in the ocean; also, let

$$\begin{aligned} MP &= r, & PCM &= \phi, \\ PC &= a, & PMC &= \theta. \\ CM &= R, \end{aligned}$$

The force exerted by the moon upon the particle at P is $\frac{M}{r^2}$, where M is the mass of the moon, that of the particle P being unity.

Draw PX parallel to MC, and PY perpendicular to MC, and let X and Y be the components of the disturbing force parallel to these lines respectively.

Hence we have,

$$\begin{aligned} X &= \frac{M \cos \theta}{r^2} - \frac{M}{R^2}, \\ Y &= \frac{M \sin \theta}{r^2}. \end{aligned} \tag{1}$$

* The germ of the geometrical portion of the following calculations is to be found in a remarkable Paper, published by the Rev. T. K. Abbott.

F.T.C.D, in the *Quarterly Journal of Pure and Applied Mathematics*, No. 45 (pp. 7-16), March, 1872.

But, since

$$\sin \theta = \frac{a}{r} \sin \phi,$$

and

$$r^2 = R^2 - 2aR \cos \phi + a^2,$$

or,

$$r^2 = R^2 (1 - 2 \cos \phi U + U^2),$$

where

$$U = \frac{a}{R}.$$

Using these equations, the expressions for X and Y become

$$X = \frac{M}{R^2} \left\{ \frac{(1 - 2 \cos \phi U + \cos^2 \phi U^2)^{\frac{1}{2}}}{(1 - 2 \cos \phi U + U^2)^{\frac{3}{2}}} - 1 \right\},$$

$$Y = \frac{M}{R^2} \frac{\sin \phi U}{(1 - 2 \cos \phi U + U^2)^{\frac{3}{2}}}; \quad (2)$$

but,

$$(1 - 2 \cos \phi U + \cos^2 \phi U^2)^{\frac{1}{2}} = 1 - \cos \phi U + 0 \cdot U^2 + 0 \cdot U^3 + \&c.,$$

and

$$(1 - 2 \cos \phi U + U^2)^{-\frac{3}{2}} = 1 + 3 \cos \phi U + \frac{3}{2} (5 \cos^2 \phi - 1) U^2 + 10 \cos^3 \phi U^3 + \&c.$$

Substituting these expansions in (2), we find—

$$X = \frac{M}{R^2} \left\{ 2 \cos \phi U + \frac{3}{2} (3 \cos^2 \phi - 1) U^2 + \frac{5 \cos^3 \phi + 3 \cos \phi}{2} U^3 + \&c., \right.$$

$$Y = \frac{M}{R^2} \left\{ \sin \phi U + 3 \sin \phi \cos \phi U^2 + \frac{3}{2} (5 \cos^2 \phi - 1) \sin \phi U^3 + \&c. \right. \quad (3)$$

These are the expressions for the disturbing force of the moon upon the ocean, carried to the third degree of approximation; in this case we have—

$$\frac{M}{R^2} = \frac{1}{10000} \text{ ft. per second,} \quad (q.p.)$$

$$U = \frac{a}{R} = \frac{1}{60}. \quad (q.p.)$$

The disturbing forces are so small, compared with the earth's gravity, that we need only consider their tangential (or horizontal) resultant, as their resultant opposing or combining with gravity cannot produce any sensible effect. In fact, the tangential resultant is opposed only by the friction of the ocean upon its bed, and that of the water upon itself, which is very small; while the radial component is opposed by the whole weight of the ocean.

Let T denote the tangential force, then we have (Fig. 1),

$$T = X \sin \phi + Y \cos \phi.$$

Introducing the expressions for X and Y , we obtain, finally,

$$T = \frac{M}{R^2} \left\{ 3 \sin \phi \cos \phi U + \frac{3}{2} (5 \cos^2 \phi - 1) \sin \phi U^2 + 10 \cos^3 \phi \sin \phi U^3 + \&c. \right\} \quad (4)$$

This expression for the tangential disturbing force may be thus written:—

$$T = \frac{M}{R^2} \left\{ \frac{3}{2} \sin 2\phi U + \frac{3}{8} (\sin \phi + 5 \sin 3\phi) U^2 + \frac{5}{4} (2 \sin 2\phi + \sin 4\phi) U^3 + \&c. \right\} \quad (5)$$

Corollary 1.—The disturbing forces of the sun upon the ocean are represented by the preceding expressions, *mu-*

tatis mutandis. Let S and E denote the masses of the sun and earth; we know that

$$S = 359551 E,$$

and $E = 88 M;$

hence we have,

$$S = 359551 \times 88 M. \quad (a)$$

Also, if R' denote the sun's distance from the earth, we know that :

$$R' = 23750 a$$

$$R = 60 a;$$

hence,

$$R' = 396 R. \quad (b)$$

Combining (a) and (b), we find—

$$\frac{S}{R'^2} \div \frac{M}{R^2} = \frac{359551 \times 88}{(396)^2} = 201.77. \quad (c)$$

This result shows that the *absolute* attraction of the sun upon the ocean is more than 200 times greater than that of the moon; but the disturbing (or tidal) forces vary as

$$\frac{M}{R^2} \times U, \quad \text{and} \quad \frac{S}{R'^2} \times U':$$

now,

$$U = \frac{1}{60} \quad U' = \frac{1}{23750}. \quad (a)$$

Therefore,

$$\frac{SU'}{R'^2} \div \frac{MU}{R^2} = 201.77 \times \frac{60}{23750};$$

or,

$$\frac{\text{Sun's Tidal Force}}{\text{Moon's Tidal Force}} = 0.5093 \quad (d)$$

This is the theoretical ratio of the solar to the lunar

tide; observations show the actual effect to be somewhat less than theory indicates.

Corollary 2.—The following geometrical construction represents the disturbing force, if we neglect powers of U beyond the first :—

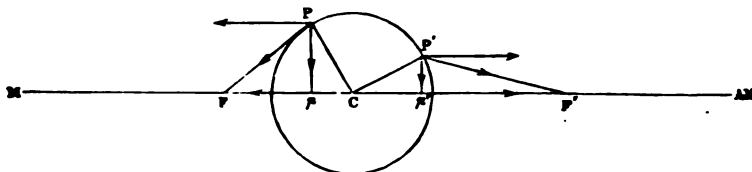


Fig. 2.

Let M and AM represent the directions of the Moon and Anti-moon,* and let P be any point in the ocean; draw Pp perpendicular to MC, and take CF equal to three times Cp; I say that PF represents the disturbing force, using a scale of measurement in which MC represents the attraction of the moon upon a particle placed at the centre of the earth. For, by equations (3), we have—

$$X : \frac{M}{R^2} :: 2a \cos \phi : R,$$

$$Y : \frac{M}{R^2} :: a \sin \phi : R;$$

or,

$$X : \frac{M}{R^2} :: pF : R,$$

$$Y : \frac{M}{R^2} :: Pp : R;$$

or, if $MC = R$ be taken to represent the attraction of the moon upon a particle at the centre of the earth; then, on the same scale, pF and Pp will represent the components

* That is, an imaginary, or mock moon, equal to the real moon in attractive force, and placed in the diametrically opposite point of the sky.

of the disturbing force, and PF will represent the whole disturbing force, in magnitude and direction; for PpF represents the triangle of equilibrium.

It is evident that the disturbing force, at any point P' , on the side of the earth opposite to the moon, will be $P'F'$, found by making CF' equal to three times Cp' ; so that the water at the far side of the earth bears the same relation to the anti-moon that the water on the near side of the earth bears to the real moon.

Corollary 3.—The construction given in the preceding *Corollary* admits of an elegant geometrical demonstration, as follows:—

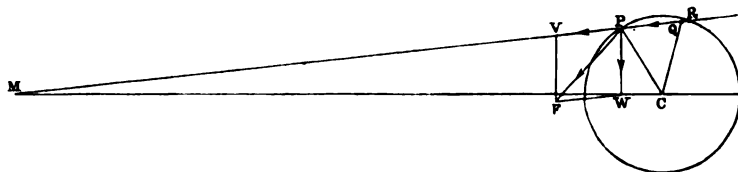


Fig. 3.

Let M be the moon, C the centre of the earth, and P any particle of the ocean; measure off MQ , a third proportional to MP and MC ; then

$$MQ : MP :: MC^2 : MP^2,$$

i.e.,

$$MQ : MP :: \text{attraction of moon at } P \\ : \text{attraction of moon at } C.$$

If, now, we adopt a scale of measurement such that MP denotes the moon's attraction at C , then MQ will denote the moon's attraction at P ; and QP will denote the disturbing force, in the direction PM , while PW denotes the disturbing force in the direction at right angles to MC .

Now draw PV equal to QP , and we have the disturbing forces acting at P expressed by the lines PW and PV . Complete the parallelogram $PVFW$, and PF will be the total disturbing force.

But, in the triangles QMC and CMP, we have the angle at M common, and the sides about the common angle proportional, viz. :—

$$QM : MC :: CM : MP.$$

Therefore (Euc. vi. 6), the angle MCP is equal to the angle MQC; but MPQ is very nearly parallel to MC,* and therefore the angle MCP is very nearly equal to the angle CPQ (Euc. i. 29); therefore the angle CPQ is very nearly equal to the angle CQP; and therefore the point Q falls very nearly upon the point R, where MPQR intersects the circle (really a little inside).

If we assume Q to fall upon the circle, and PQ to be parallel to MC, we have—

$$\begin{aligned} QP &= PV = 2a \cos \phi, \\ PW &= a \sin \phi, \\ FC &= 3a \cos \phi, \end{aligned}$$

and the point F will fall upon MC, making $FC = 3 WC$.

Corollary 4.—The tidal tangential disturbing force of the earth upon the moon's surface is *twenty-two times greater* than that of the moon upon the earth's surface.

For, by equation (5),

$$T = \frac{E}{R^2} \times \frac{a'}{R} \times \frac{3}{2} \sin 2\phi,$$

where E is the mass of the earth, and a' is the radius of the moon; now we have—

$$E = 88 M,$$

$$a' = \frac{a}{4}.$$

Therefore,

$$T = 22 \frac{M}{R^2} \frac{a}{R} \frac{3}{2} \sin 2\phi.$$

Q. E. D.

* Because the distance of the moon is 60 times the radius of the earth.

PROPOSITION II. (STATICAL PROBLEM.)

It is required to find the shape of the surface of the water in a circular canal, subjected to the action of an attractive force directed towards the centre of the circle, and to small disturbing forces (similar to those of the moon upon the earth) caused by the attraction of a distant body (M) situated in the plane of the canal.

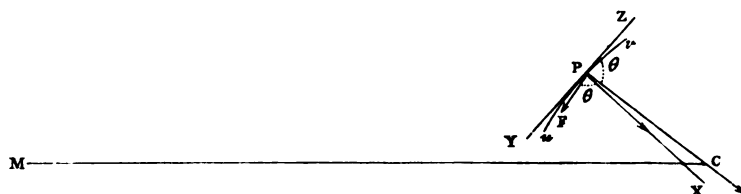


Fig. 4.

Let M be the moon, C the centre of the earth, and P a particle in the surface of the canal in a state of equilibrium; and let uv be a portion of the unknown surface; then the earth's attraction acts in the line PC, and the moon's tangential disturbing force acts at right angles to PC, in the direction PF: let PX be the direction of the resultant of these two forces. We have, calling FPX, θ ;

$$\cot \theta = \frac{\text{Tangential Force}}{\text{Earth's Gravity}};$$

but, by equation (5),

$$T = \frac{3}{2} \frac{M}{R^2} \frac{a}{R} \sin 2\phi = k \sin 2\phi;$$

where

$$k = \frac{3}{2} \frac{M}{R^2} \frac{a}{R},$$

$$\text{Earth's gravity} = \frac{E}{a^2} = g.$$

Therefore,

$$\cot \theta = \frac{3}{2} \frac{M}{E} \frac{a^3}{R^3} \sin 2\phi = \frac{k}{g} \sin 2\phi.$$

But, if we draw YPZ a tangent to the curve *uv* at the point P, since the surface of the water is in equilibrium, it must be at right angles to the resultant PX; and therefore the radius vector CP makes with the tangent ZPY the same angle θ that PF makes with PX. Now, it is evident that in polar co-ordinates

$$\cot \theta = \frac{d\rho}{\rho d\phi}.$$

Equating the two values of $\cot \theta$ (mechanical and geometrical), we find

$$-\frac{d\rho^*}{\rho d\phi} = \frac{k}{g} \sin 2\phi. \quad (6)$$

Integrating this equation, we find the surface of the water

$$\log \rho = \frac{k}{2g} \cos 2\phi + \text{const.}$$

or finally,

$$\log \left(\frac{\rho}{\beta} \right) = \frac{k}{2g} \cos 2\phi;$$

or,

$$\rho = \beta e^{\frac{k}{2g} \cos 2\phi}. \quad (7)$$

Expanding, we have

$$\rho = \beta \left(1 + \frac{k}{2g} \cos 2\phi + \&c. \right);$$

* The negative sign must be introduced here, because it is evident that H. W. will occur under the moon, so

that the increments of ϕ and ρ have opposite signs.

or, neglecting small quantities of an order higher than $\frac{k}{2g}$, we have

$$\rho = \beta \left(1 + \frac{k \cos 2\phi}{2g} \right), \quad (8)$$

which, when $\phi = 45^\circ$, gives us

$$\rho = \beta,$$

where β is the mean value of ρ ; or

$$\beta = a,$$

where a is the radius of the earth.

If we take (as an example) the case of the moon and earth, we have

$$k = \frac{3}{2} \frac{M}{R^2} \frac{a}{R} = \frac{3}{2} \times \frac{1}{10000} \times \frac{1}{60};$$

$$k = \frac{1}{400000} \text{ foot per second};$$

$$g = 32.2 \text{ feet per second};$$

$$\beta = 4000 \times 5280 \text{ feet.}$$

Hence, the maximum elevation of the water, in Syzygies, under the moon and antimoon, and its maximum depression in Quadratures, would be

$$\frac{\beta k}{2g} = \frac{4000 \times 5280 \times 12}{400000 \times 32.2 \times 2} \text{ inches} = 9.91 \text{ inches. (q. p.)}$$

Corollary 1.—The shape of the water surface, represented by an equation of the form

$$\rho = \beta e^a \cos 2\phi,$$

although undistinguishable from that of an ellipse of small

eccentricity, in the case where β is much greater than a . becomes very different in other cases.

For example, let

$$\beta = e^a.$$

From this we have

$$\log \rho = 5a \left(1 - \frac{1}{5} \cos 2\phi \right).$$

The curve thus represented may be readily plotted, and gives the following figure:—

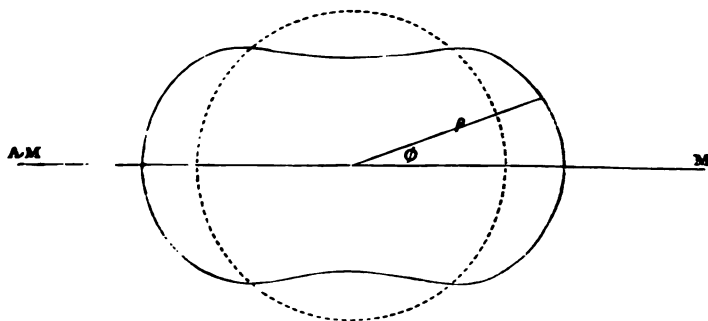


Fig. 5.

Corollary 2.—It is required to find the elevation or depression of the water in a circular canal, equal in diameter to the moon, acted on by a central attractive force equal to lunar gravity, and disturbed by the earth placed at a distance from the centre of the canal, in its plane, equal to its present distance from the moon.

From equation (8) we see that the greatest height of the equilibrium tidal level is

$$\frac{k'\beta'}{2g'},$$

where the marked letters refer to the case of the tidal canal on the surface of the moon. But

$$k' = \frac{3}{2} \frac{E}{R^2} \frac{a'}{R};$$

$$\beta' = a';$$

$$g' = \frac{M}{a'^2}.$$

Therefore,

$$\frac{k'\beta'}{2g'} = \frac{3}{4} \frac{E}{M} \left(\frac{a'}{R} \right)^3 \times a';$$

and substituting $a' = 1000$ miles, $R = 240,000$ miles, we have

$$\frac{k'\beta'}{2g'} = \frac{3}{4} \times 88 \times \left(\frac{1}{240} \right)^3 \times 1000 \times 5280 \times 12 \text{ inches} = 302.5 \text{ inches}.$$

This tide is more than thirty times greater than the corresponding tide produced by the moon upon the earth.

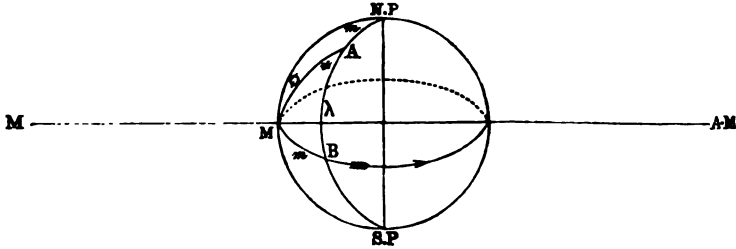
Corollary 3.—In general, if a, a' be the radii of two bodies E, M , the ratio of the statical tide produced by E upon M , to that of the statical tide produced by M upon E , *cæteris paribus*, is

$$\frac{E^2}{M^2} \frac{a'^4}{a^4}. \quad (9)$$

PROPOSITION III. (PROBLEM.)

It is required to find the laws of tidal motion in a Meridional canal, of constant width and depth, on the surface of the earth, the moon being supposed to be in the Equator.

Let NPSP (fig. 6) be the earth's axis of rotation, MAM the direction of the moon and antimoon, and let NPABSP be the meridional canal at any instant; then MPB = MB = m



A, as seen from the centre of the earth, *i. e.* ϕ is the angle used in Prop. I.

$$\begin{aligned} Y &= \frac{3}{2} \frac{M}{R^2} \frac{a}{R} \sin 2\phi \cos u, \\ X &= \frac{3}{2} \frac{M}{R^2} \frac{a}{R} \sin 2\phi \sin u, \end{aligned} \quad (10)$$

Now, the triangle MAB is right-angled at B, and therefore

$$\begin{aligned}\sin m &= \sin u \sin \phi; \\ \cos \phi &= \cos m \cos \lambda; \\ \cos u &= \tan \lambda \cot \phi.\end{aligned}$$

$$\begin{aligned} Y &= \frac{3}{2} \frac{M}{R^2} \frac{a}{R} \sin 2\lambda \cos^2 m; \\ X &= \frac{3}{2} \frac{M}{R^2} \frac{a}{R} \cdot \cos \lambda \sin 2m. \end{aligned} \quad (11)$$

As $\cos^2 m$ and $\sin 2m$ pass through all their changes in

180°, both the component forces in (11) will produce semi-diurnal tides.

1°. To find the horizontal velocity of the tide in the canal.

The disturbing force is

$$f = k \sin 2\lambda \cos^2 m,$$

and is always directed towards the equator.

It may be thus written—

$$f = \frac{k \sin 2\lambda}{2} + \frac{k \sin 2\lambda}{2} \cos 2m.$$

The first term is independent of the moon's hour angle, and, when combined with the force of gravity, will give an equilibrium surface to the water, or *mean tidal level*, according to the principles laid down in Prop. II.

The equation of this surface is found from the equation there given, viz.,

$$\frac{d\rho}{\rho d\lambda} = -\frac{f}{g} = -\frac{k \sin 2\lambda}{2g}$$

(writing λ for ϕ).

This gives, for the equilibrium surface,

$$\log \left(\frac{\rho}{a} \right) = \frac{k \cos 2\lambda}{4g};$$

or, neglecting the smaller terms,

$$\rho = a + \frac{ka}{4g} \cos 2\lambda;$$

or, if y denote the varying depth, and δ the mean depth, of the canal,

$$y = \delta + \frac{ka}{4g} \cos 2\lambda. \quad (12)$$

The statical bulge at the equator and depression at the pole of the mean tide level surface is $\frac{ka}{4g} = 4.95$ inches, or half that of Prop. II.

The part of the disturbing forces varying with the time, or moon's place, viz.,

$$f = \frac{k \sin 2\lambda}{2} \cos 2m$$

gives us the horizontal velocity, as follows :—

If u = horizontal velocity, $\omega = \frac{2\pi}{T}$ and T = length of lunar day,

$$du = f dt ;$$

$$m = \omega t ;$$

$$u = \frac{k \sin 2\lambda}{4\omega} \sin 2m + \text{const.} ;$$

but when

$$m = 0, u = 0.$$

Therefore, the horizontal velocity is

$$u = \frac{k \sin 2\lambda}{4\omega} \sin 2m. \quad (13)$$

This represents a semi-diurnal *stationary tidal wave*, whose *Head* is at the Equator and at the Poles, and whose *Node* (or Hinge) is at 45° lat.

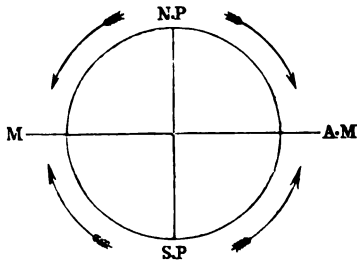


Fig. 7 (a).

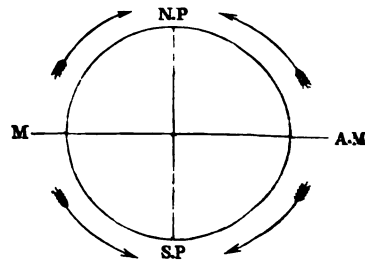


Fig. 7 (b).

Fig. 7 (a) shows the directions of the tidal currents from $m = 0$ to $m = 90^\circ$, during which time the water is rising under the moon and antimoon, and falling at the poles.

Fig. 7 (b) shows the direction of the tidal currents from $m = 90^\circ$ to $m = 180^\circ$, during which time the water is falling under the moon and antimoon, and rising at the poles.

We have therefore, from equation (13), and from inspection of Figs. 7, 8, the following results, among others:—

- (1). $u = 0$, when $m = 0$, or $m = 90^\circ$.
- (2). $u = \max^m$, when $m = 45^\circ$, and $\lambda = 45^\circ$.
- (3). At all places, whose latitude is less than 45° , L. W. occurs when $m = 0$, or $m = 180^\circ$; and H. W. when $m = 90^\circ$, or $m = 270^\circ$.
- (4). At all places, whose latitude is greater than 45° , H. W. occurs when $m = 0$, or $m = 180^\circ$; and L. W. when $m = 90^\circ$, or $m = 270^\circ$.
- (5). The velocity changes sign, simultaneously, throughout the entire quadrant whenever m passes through 0° , 90° , 180° , 270° .

2°. To find the greatest rise and fall of the tide at the equator and poles.

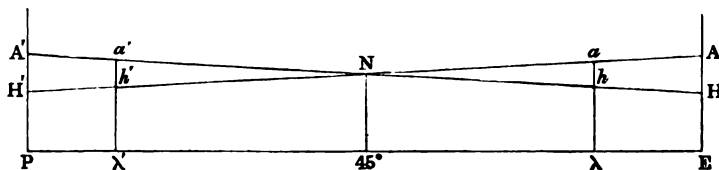


Fig. 8.

Let PE (Fig. 8) represent the quadrant from pole to equator shown as a right line, and let H and A represent L. W. and H. W. at the equator; H' and A' the same at the pole; and let N be the *node of the tide*, at 45° lat., where the water never rises or falls, and where the velocity is a maximum.

It is evident that every six lunar hours the volumes AHN and A'H'N (which are equal to each other) change places, and that a volume of water equal to each passes through the nodal section at N, whose depth is δ .

When $m = 0$, the surface of the canal is A'NH, making L. W. at all places from 0 to 45° lat.; and H. W. at all places from 45° to 90° lat.; and when $m = 90^\circ$, the surface of the canal is ANH', making H. W. at all places from 0 to 45° lat., and L. W. at all places from 45° to 90° lat.

The velocity of the water at N, passing through the constant section δ , is, by (13), equal to

$$\frac{k}{4\omega} \sin 2m.$$

If we multiply by δ , and integrate from $m = 0$ to $m = 90^\circ$, we find

$$\left. \begin{array}{l} \text{Quantity of water passing through section, at } 45^\circ \\ \text{lat. during 6 lunar hours, from L. W. to H. W.} \end{array} \right\} = \frac{k\delta}{4\omega}.$$

Equating this to the volume AHN, we obtain, since

$$PE = \frac{\pi a}{2},$$

$$\frac{AH}{2} \times \frac{\pi a}{4} = \frac{k\delta}{4\omega^2};$$

or, finally,

$$\begin{aligned} \frac{AH}{2} &= \frac{k\delta}{\pi a \omega^2} = \text{Rise and Fall of Tide at Pole and Equator.} \\ &= \frac{89280 \times 89280}{400000 \times 4\pi^3} \times \frac{\delta}{a}; \end{aligned} \quad (14)$$

because there are 89280 seconds in the mean lunar day.

If $\delta = 100$ miles, the rise and fall of the tide at the equator and poles = 4.02 feet.

Corollary 1.—To find the maximum rise or fall of the tide at any place.

It is evident from Fig. 8 that at any latitude λ , between 0 and 45° , the maximum *range* of the tide ah is

$$ah = AH \times \frac{45 - \lambda}{45} = \frac{2k\delta}{\pi a\omega^2} \times \frac{45 - \lambda}{45};$$

and that at any latitude λ' , between 45° and 90° the maximum *range* of the tide $a'h'$ is

$$a'h' = A'H' \times \frac{\lambda' - 45}{45} = \frac{2k\delta}{\pi a\omega^2} \times \frac{\lambda' - 45}{45}.$$

Corollary 2.—To find the rise and fall of tide in a meridional canal in the moon at the time when she had a rotation as quick as that represented by our lunar day.

The rise and fall of tide is

$$\frac{k\delta}{\pi a\omega^2} = \frac{3}{2} \frac{M}{R^3} \frac{\delta}{R} \times \frac{1}{\omega^2}$$

in the case of the earth, and

$$\frac{k\delta'}{\pi a'\omega'^2} = \frac{3}{2} \frac{E}{R^3} \frac{\delta'}{R} \times \frac{1}{\omega'^2}$$

in the case of the moon; and *cæteris paribus* these are in the proportion of E to M . The lunar meridional canal tide is therefore 354 feet.

PROPOSITION IV. (PROBLEM.)

It is required to find the laws of tidal motion in an equatorial canal of constant width and depth on the surface of the earth, the moon being in the equator.

Let MAM (Fig. 9) represent the directions of the moon and antimoon, and let ACBDA represent the equatorial

canal; the disturbing force (tangential) at any point P will have the value (5)

$$T = f = -k \sin 2\phi,$$

and will act *against* the rotation, in the quadrants AC and BD; and *with* the rotation, in the quadrants CB and DA.

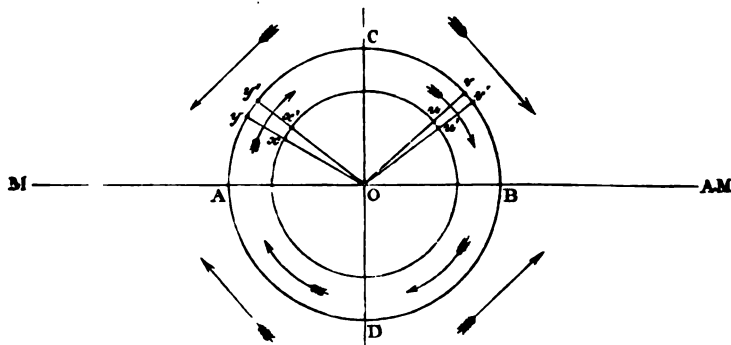


Fig. 9.

From this it is evident that the velocity of the water in the canal will be greatest at A and B, and least at C and D. Therefore L. W. will occur under the moon and anti-moon, and H. W. at 90° and 270° distant. [Newton, *Princip.*, lib. i., prop. 66, corr. 18, 19.]

1°. To find the horizontal velocity of the water.

Let u denote the velocity, and let ϕ be measured from the line OM, in the direction of the rotation; then

$$du = -f dt,$$

where

$$f = k \sin 2\phi;$$

but

$$\phi = \omega t,$$

where

$$\omega = \frac{2\pi}{T}, \text{ where } T = 89280,$$

the number of seconds in the mean lunar day.

Therefore,

$$u = -k \int \sin 2\phi dt = \frac{k}{2\omega} \cos 2\phi + \text{const.}$$

If we denote by u_0 the velocity of the water when $\phi = 0$, this becomes

$$u = u_0 + \frac{k}{2\omega} (\cos 2\phi - 1);$$

which may be also thus written :

$$u = V_0 + \frac{k}{2\omega} \cos 2\phi, \quad (15)$$

where

$$V_0 = u_0 - \frac{k}{2\omega}.$$

In equation (15) V_0 denotes the velocity of the earth's surface, and

$$\frac{k}{2\omega} \cos 2\phi$$

denotes the velocity due to the disturbing influence of the moon. It is evident, from inspection, that—

$$u = V_0, \text{ when } \phi = 45^\circ, 135^\circ, 225^\circ, 315^\circ,$$

$$u = V_0 + \frac{k}{2\omega}, \text{ when } \phi = 0, 180^\circ,$$

$$u = V_0 - \frac{k}{2\omega}, \text{ when } \phi = 90^\circ, 270^\circ.$$

2°. *To find the shape of the water surface.*

Let PCQ (Fig. 10) denote the first quarter of the earth's rotation, the moon being in the direction M. The arrows show the directions of the disturbing force and of the rotation, which (in this quarter) are opposed.

Let CAB and CA'B' be two consecutive positions of any point A on the canal.

We have already seen that there is L. W. at P (syzygies), and H. W. at Q (quadratures); hence, the depth of the water at B'A' will be greater than the depth at BA, exceeding the latter by the quantity B'p. Now, the horizontal velocity was a maximum at P, and has been diminished continually, while the point A travelled from P to A; and diminished still more in passing to A'.

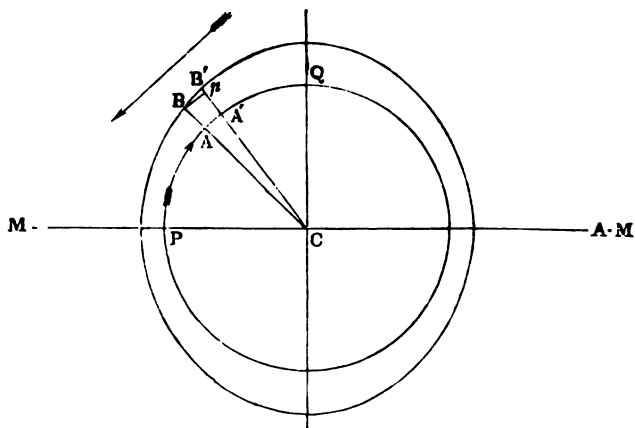


Fig. 10.

We therefore have a less depth and greater velocity at AB than at A'B'; and the volume of water AA'B'B will not retain its stable form, unless the *inflow* through BA equals the *outflow* through B'A'; or, unless

$$uy^* = u'y', \quad (16)$$

where u, u' are the velocities at A and B, and y, y' are the depths of the canal at A and A'.

* This is the *equation of continuity*; and the water breaks when it fails, as will be shown further on.

Equation (16) is equivalent to

$$uy = C,$$

in which, substituting for u from (15), we find

$$y \left(V_0 + \frac{k}{2\omega} \cos 2\phi \right) = C,$$

and

$$\delta V_0 = C,$$

because $y = \delta$ (mean depth of the canal), when $\phi = 45^\circ$.

Hence we obtain,

$$y = \frac{\delta V_0}{V_0 + \frac{k}{2\omega} \cos 2\phi}. \quad (17)$$

This equation gives the depth of the canal for any value of ϕ . It may be written (neglecting small quantities of the higher orders)—

$$y = \delta - \frac{k\delta}{2\omega V_0} \cos 2\phi. \quad (17 \text{ bis.})$$

This equation will give us in ordinary polar co-ordinates—

$$\rho = a - \frac{k\delta}{2\omega V_0} \cos 2\phi. \quad (17 \text{ ter.})$$

We can now calculate the maximum rise and fall of the tide for a canal 100 miles deep.

It is—

$$\frac{k\delta}{2\omega V_0},$$

where

$$V_0 = \omega a.$$

Writing the proper values, we have—

$$\frac{k\delta}{2\omega V_0} = \frac{100 \times (89,280)^2}{2 \times 400000 \times 4000 \times 4\pi^2} = 6.31 \text{ feet.}$$

3°. *To calculate the Diurnal and Tertio-diurnal Tides introduced into an Equatorial Canal, by the terms of higher*

order than the first in the expression (5) for the tangential disturbing force of the moon.

The successive terms of the disturbing force (5) are (writing $\phi = m$)—

$$1^{\circ}. \quad \frac{3}{2} \frac{M}{R^3} \frac{a}{R} \sin 2m;$$

$$2^{\circ}. \quad \frac{3}{8} \frac{M}{R^3} \left(\frac{a}{R} \right)^2 \{ \sin m + 5 \sin 3m \};$$

$$3^{\circ}. \quad \frac{5}{4} \frac{M}{R^3} \left(\frac{a}{R} \right)^3 \{ 2 \sin 2m + \sin 4m \}.$$

Hence the three terms become, writing

$$k = \frac{3}{2} \frac{M}{R^3} \frac{a}{R} = \frac{1}{400000} \text{ ft.};$$

$$1^{\circ}. \quad k \sin 2m;$$

$$2^{\circ}. \quad \frac{k}{240} (\sin m + 5 \sin 3m);$$

$$3^{\circ}. \quad \frac{k}{4320} (2 \sin 2m + \sin 4m).$$

Introducing the second of these terms into the integration for the horizontal velocity, we have—

$$du = -k \sin 2m dt - \frac{k}{240} (\sin m dt + 5 \sin 3m dt),$$

which gives (since $m = \omega t$),

$$u = \frac{k}{2\omega} \left(\cos 2m + \frac{\cos m}{120} + \frac{\cos 3m}{72} \right) + C,$$

or, finally,

$$u = V_0 + \frac{k}{2\omega} \left(\cos 2m + \frac{\cos m}{120} + \frac{\cos 3m}{72} \right);$$

where V_0 is the value of u , for the hour angle m , which makes

$$\cos 2m + \frac{\cos m}{120} + \frac{\cos 3m}{72} = 0.$$

The value of m , which satisfies this equation, lies between

$$44^\circ 53' \text{ and } 44^\circ 54',$$

or falls short of 45° by less than 7 minutes of arc, or less than 2 minutes of time.

The times of H. W. and L. W. are, therefore, affected by the *secondary* disturbing forces by less than 2 minutes.

The term depending on $\cos 2m$ is the semi-diurnal tide already discussed, whose range is 12.62 feet in a canal 100 miles deep.

The term depending on $\cos m$ is a *secondary** diurnal tide, whose range is 1.0 inch.

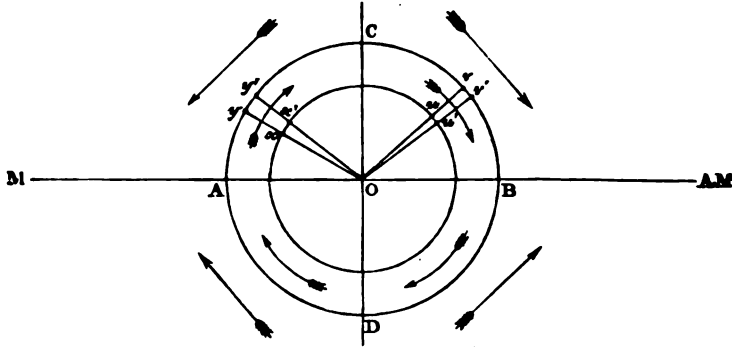
The term depending on $\cos 3m$ is a *secondary** tertio-diurnal tide, whose range is 2.6 inches.

Corollary 1.—The following proof that L. W. occurs under the moon and antimoon was first given by the Rev. T. K. Abbott, Fellow of Trinity College, Dublin; it is as simple as Newton's proof, and is more direct:—

Let O be the centre of the earth (Fig. 9), and let ACBD be the equatorial canal, revolving in the direction of the arrows, like the hands of a watch; the outer arrows denote the direction of the disturbing force in the four quadrants. The disturbing force vanishes at A, C, B, and D, and changes its direction in passing through zero. Hence it opposes the motion of the water from A to C, and from B to D; while it aids the motion of the water from C to B,

* I call *secondary* tides those depending on higher powers of $\frac{a}{R}$; and *primary* tides those depending on $\frac{a}{R}$ alone.

and from D to A. Hence the velocity of the water will be greatest at A and B, and will be least at C and D; therefore AB will be the minor axis of the tidal surface, and CB the major axis, for the surface will have least curva-



ture where the velocity is greatest, and greatest curvature where the velocity is least, from elementary dynamical principles.

Thus far is Newton's proof. Mr. Abbott's is the following :—

Let xy and $x'y'$ be two sections of the water, taken near each other in a quadrant, where the disturbing force *opposes* the rotation.

The velocity of the water at A (which was its maximum) has been lessened, in moving to Oxy , by the tangential force summed from OA to Oxy ; and in moving from OA to $Ox'y'$ it has been lessened by the tangential force summed from OA to $Ox'y'$; therefore the velocity of the water passing out through $x'y'$ is less than that of the water entering through xy ; and therefore the water is *rising* in the region $xyy'x'$; and, in like manner, the water can be shown to be rising at every place from A to C, being stationary at A (low water), and at C (high water). If we

now take two near sections, uv and $u'v'$, in a quadrant CB, where the disturbing force aids the velocity, it will be evident that the velocity, which was a *minimum* at C, will be greater at $u'v'$ than at uv ; hence the water is pouring out of $uvu'u'$ faster through $u'v'$ than it is entering through uv ; and therefore the water is *falling* at all points from C to B, where H. W. and L. W. respectively occur.

Corollary 2.—If we suppose that, in former times, the moon revolved on her axis in the same time that the earth now does; it is required to find the range of tide in an equatorial canal, 100 miles deep, on the moon's surface.

The maximum rise and fall of the tide is represented by

$$\frac{k\delta}{2\omega V_0} = \frac{k\delta}{2a\omega^3},$$

which, in the terrestrial tide, is*

$$\frac{3}{4} \frac{M}{R^2} \frac{\delta}{R} \times \frac{1}{\omega^3};$$

and, in the case of the lunar tide, is (*cæteris paribus*)*

$$\frac{3}{4} \frac{E}{R^2} \frac{\delta}{R} \times \frac{1}{\omega^3}.$$

The ratio of these is $\frac{E}{M}$, or the lunar canal tide will be 88 times as great as the terrestrial tide, or 555.3 feet. This enormous tidal motion produced important effects in stopping the moon's rotation, as will be shown afterwards.

* It will be observed that a (the radius of the disturbed body) has disappeared from the expression for the maximum rise or fall of tide in an equatorial canal. This can be seen *a priori*; for the disturbing force varies

as a , and the rotation velocity, also, varies as a ; so that the depth of the canal, δ (or quantity of water) being given, the disturbance of surface, x , will be the same for all spheres situated at the same distance, R , from each other.

Corollary 3.—The equation (17 *ter.*) found for the tidal surface of an equatorial canal, viz.,

$$\rho = a - \beta \cos 2\phi,$$

has a great variety of forms, according to the values of the parameters : a and β these forms are given in Fig. 11,

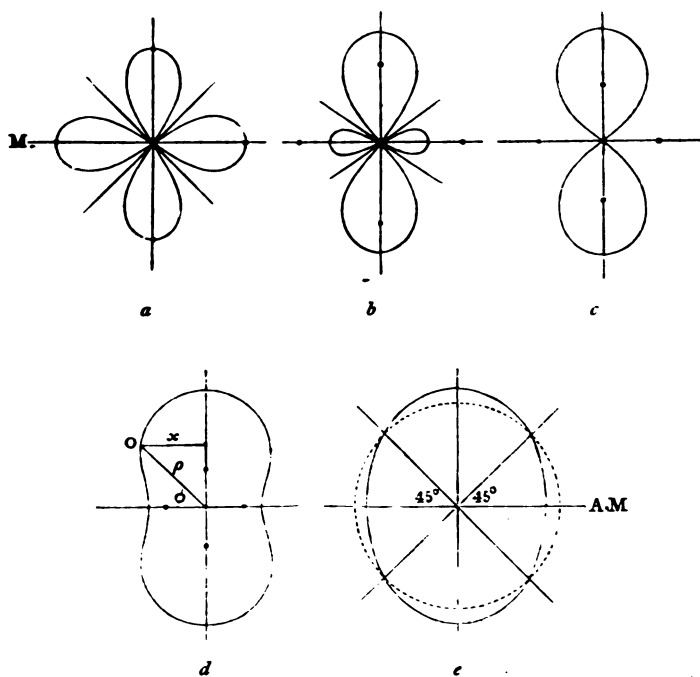


Fig. 11.

where—

- In (a), . . . $a = 0$.
 „ (b), . . . $a < \beta$.
 „ (c), . . . $a = \beta$.
 „ (d), . . . $a > \beta$.
 „ (e), . . . $a \text{ much } > \beta$ (case of tides).

The critical case, when the curve passes from the dumb-bell shape (*d*) to the elliptic shape (*e*), occurs when $a = 5\beta$. For *d* (Fig. 11), let O be the variable point on the dumb-bell figure, where the tangent becomes parallel to the axis of *y*, and let *x* be the abscissa, we have, obviously,

$$\rho = a - \beta \cos 2\phi,$$

$$x = \rho \cos \phi;$$

or,

$$x = (a - \beta \cos 2\phi) \cos \phi;$$

$$dx = - (a - \beta \cos 2\phi) \sin \phi d\phi + 2\beta \cos \phi \sin 2\phi d\phi.$$

When *x* is a maximum, this equation is equal to zero, or, after a few reductions,

$$0 = \sin \phi [- (\beta + a) \cos^2 \phi + (5\beta - a) \sin^2 \phi].$$

This gives us

$$\tan \phi = \pm \sqrt{\frac{5\beta - a}{\beta + a}}, \text{ and } \phi = 0$$

to determine the six points where the tangent is parallel to the axis of *y*. When $a = 5\beta$, the bulge vanishes, and the four variable points O coincide with the extremity of the minor axis. When $a > 5\beta$, ϕ is imaginary, and the curves take a shape resembling that of an ellipse.

Corollary 4.—It is required to find the tidal effect produced upon an equatorial canal in Jupiter, by each of his four satellites.

The general expression for the maximum rise or fall of tide in an equatorial canal is (17 bis)—

$$x = \pm \frac{k\delta}{2a\omega^2} = \pm \frac{3}{4} \frac{M}{R^2} \frac{a}{R} \times \frac{1}{\omega^2}, \quad (17 \text{ quater.})$$

where,

$$k = \frac{3}{2} \frac{M}{R^2} \frac{a}{R},$$

$\frac{M}{R^2}$ = attraction of disturbing body at centre of disturbed body.

$\frac{\delta}{R}$ = ratio of depth of canal to distance between centres of disturbing body and disturbed body.

ω = relative angular velocity of disturbing body and of disturbed body.

The following Table* contains the elements of Jupiter and of his satellites, so far as we require them :—

Elements of Jupiter and of his Satellites.

Satellite.	Sidereal Revolution.	Distance in Jovian radii.	Diameter in Miles.	Mass.
	d. h. m. s.			
1st, . .	1 18 27 33.505	6.04853	2436	0.000017328
2nd, . .	3 13 13 42.040	9.62347	2187	0.000023235
3rd, . .	7 3 42 33.360	15.35024	3573	0.000088497
4th, . .	16 16 32 11.271	26.99835	3057	0.000042659
	Time of Rotation. h. m. s.			
Jupiter, .	9 55 26	—	92,164	1.000000000

Mean force of gravity at surface of Jupiter = 78.8 feet per second.

If S , J denote the masses of a satellite and of Jupiter, and A denote the radius of Jupiter, we have, in equation (17 *quater.*),

$$\frac{M}{R^2} = \frac{J}{A^2} \times \frac{A^2}{R^2} \times \frac{S}{J};$$

* Loomis' *Practical Astronomy*, p. 463.

or for each satellite—

$$(1). \quad \frac{M}{R^2} = 78.8 \times \left(\frac{1}{6.04853} \right)^2 \times 0.000017328.$$

$$(2). \quad „ = 78.8 \times \left(\frac{1}{9.62347} \right)^2 \times 0.000023235.$$

$$(3). \quad „ = 78.8 \times \left(\frac{1}{15.35024} \right)^2 \times 0.000088497.$$

$$(4). \quad „ = 78.8 \times \left(\frac{1}{26.99835} \right)^2 \times 0.000042659.$$

From these data we find

$\frac{M}{R^2}$ = attraction of satellite upon a unit particle at the distance of Jupiter.

$$\text{1st satellite, . . . } \frac{1}{26,793} \text{ foot per second.}$$

$$\text{2nd satellite, . . . } \frac{1}{50,582} \quad ”$$

$$\text{3rd satellite, . . . } \frac{1}{33,788} \quad ”$$

$$\text{4th satellite, . . . } \frac{1}{216,834} \quad ”$$

The corresponding force, in the case of the moon and earth, is

$$\frac{M}{R^2} = \frac{1}{10,000} \text{ foot per second.}$$

The fraction $\frac{\delta}{R}$, for each satellite, is—

$$(1). \quad \frac{\delta}{R} = \frac{100}{46082 \times 6.0485} = \frac{1}{278,730}.$$

$$(2). \quad \text{,,} = \frac{100}{46082 \times 9.6235} = \frac{1}{443,470}.$$

$$(3). \quad \text{,,} = \frac{100}{46082 \times 15.350} = \frac{1}{707,350}.$$

$$(4). \quad \text{,,} = \frac{100}{46082 \times 26.998} = \frac{1}{1,244,310}.$$

If, during a rotation of Jupiter, the satellite stood still, ω would be the angular velocity of Jupiter; but to allow for the motion of the satellite, we must write

$$\omega = \frac{2\pi}{T},$$

where T is the synodic period of Jupiter and the satellite, found from the equation

$$T = \frac{SJ}{S - J};$$

where S , J are the times of revolution of the satellite and Jupiter.

Hence we have (in seconds)—

$$(1). \quad T^* = \frac{595 \times 2547 \times 60}{1952} = 46,582 \text{ seconds.}$$

$$(2). \quad \text{,,} = \frac{595 \times 5113 \times 60}{4518} = 40,402 \quad \text{,,}$$

$$(3). \quad \text{,,} = \frac{595 \times 10302 \times 60}{9709} = 37,880 \quad \text{,,}$$

$$(4). \quad \text{,,} = \frac{595 \times 24032 \times 60}{23437} = 36,606 \quad \text{,,}$$

* If the satellites were at rest, T seconds, the time of Jupiter's rotation would be the same for all, viz. 35,726 seconds.

From these numbers, we find $\omega = \frac{2\pi}{T}$ as follows :—

$$\text{First satellite, } \omega = \frac{1}{7413.7}$$

$$\text{Second satellite, } \omega = \frac{1}{6430.1}$$

$$\text{Third satellite, } \omega = \frac{1}{6028.9}$$

$$\text{Fourth satellite, } \omega = \frac{1}{5826.1}$$

Introducing the foregoing values into the equation (17 *quater*),

$$x = \frac{3}{4} \frac{M}{R^2} \frac{\delta}{R} \times \frac{1}{\omega^2},$$

we find,

$$\text{First satellite, } x = \frac{1}{15} \text{th of an inch.}$$

$$\text{Second satellite, } x = \frac{1}{86} \text{th} \quad ,,$$

$$\text{Third satellite, } x = \frac{1}{73} \text{rd} \quad ,,$$

$$\text{Fourth satellite, } x = \frac{1}{885} \text{th} \quad ,,$$

Corollary 5.—If at a former period* the satellites of Jupiter had a rotation equal to that of Jupiter's present relative rotation, it is required to find the tidal effect of Jupiter's disturbing force upon their equatorial canals.

If we multiply the final results of *Cor. 4* by the ratios of the mass of Jupiter to that of each of his satellites, and reduce the results to feet, we find Rise and Fall of Tide, on

$$\text{First satellite} = 318.49 \text{ feet.}$$

$$\text{Second satellite} = 59.50 \quad ,,$$

$$\text{Third satellite} = 12.89 \quad ,,$$

$$\text{Fourth satellite} = 2.20 \quad ,,$$

* As is highly probable.

We see from the foregoing that the tidal effect of the earth upon the moon has been greater than that of Jupiter upon any of his satellites; or, in other words, the earth exerted a more powerful effect, in stopping the moon's rotation by tidal friction, than Jupiter did upon his satellites.

PROPOSITION V. (PROBLEM.)

It is required to find the laws of tidal motion in a circumpolar canal of constant width and depth, the moon being in the equator.

In this case, by equation (11), the tangential disturbing force is

$$X = f = -k \cos \lambda \sin 2m.$$

This differs from the case considered in Prop. IV. only in the use of $k \cos \lambda$ for k ; and by similar reasoning we find, for the velocity in the canal,

$$u = v_0 + \frac{k \cos \lambda}{2\omega} \cos 2m,$$

where v_0 denotes the earth-velocity for latitude λ ; but

$$v_0 = V_0 \cos \lambda;$$

therefore,

$$u = \left(V_0 + \frac{k}{2\omega} \cos 2m \right) \cos \lambda.$$

The equation of continuity (16),

$$uy = u'y',$$

now becomes

$$y \left(V_0 + \frac{k}{2\omega} \cos 2m \right) \cos \lambda = \delta V_0 \cos \lambda;$$

$\cos \lambda$, therefore, disappears, and we have, for the shape of the water, as before,

$$y = \delta - \frac{k\delta}{2a\omega^2} \cos 2m. \quad (17 \text{ bis})$$

Hence, the rise and fall of the tide will be the same in all circumpolar canals, having the same depth, as in the corresponding equatorial canal.

When we come near the pole, this condition becomes impossible, and the water breaks, because the *Equation of continuity* fails.

PROPOSITION VI. (PROBLEM.)

It is required to find the laws of tidal motion, in a meridional canal of constant width and depth, when the moon has any given declination.

Let MAM be the line joining the moon and antimoon,

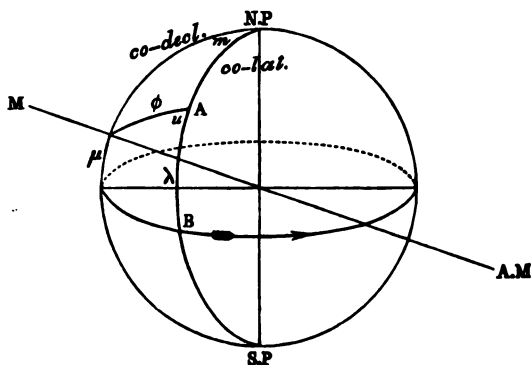


Fig. 12.

and let NPABSP be the position of the meridional canal at any moment, when m is the moon's hour angle to the west of the meridian. Let A be any point in the canal, whose latitude is $\lambda = AB$, and let $MA = \phi$, and let u be the angle between the great circle MA and the meridional canal, and let μ be the moon's declination. The tangential disturbing force in the plane of the canal will be (10),

$$f = k \sin 2\phi \cos u;$$

which, after some reductions, and remembering that

$$\cos \phi = \cos m \cos \mu \cos \lambda + \sin \mu \sin \lambda,$$

becomes,

$$f = \frac{2k}{\cos \lambda} (\sin \lambda \cos^2 \phi - \sin \mu \cos \phi);$$

and finally,

$$f = a - \beta \cos m + \gamma \cos 2m;$$

where

$$\begin{aligned} a &= \frac{k \sin 2\lambda}{4} (3 \cos 2\mu - 1), \\ \beta &= k \cos 2\lambda \sin 2\mu, \\ \gamma &= \frac{k \sin 2\lambda}{2} \cos^2 \mu. \end{aligned} \tag{18}$$

The first coefficient a consists of two parts, one independent of μ , viz. :—

$$- \frac{k \sin 2\lambda}{4};$$

which will form (as in Prop. III.) an equilibrium mean tidal surface; and the other,

$$\frac{3k \sin 2\lambda}{4} \cos 2\mu,$$

depending on $\cos 2\mu$, and therefore representing a *fortnightly* variation in the *mean tide level*.

The coefficient β depends on $\sin 2\mu$, and therefore represents a *fortnightly* variation, in the *diurnal* tide.

The coefficient γ consists, like a , of two parts; one,

$$\frac{k \sin 2\lambda}{4},$$

independent of μ , which represents the part of the semi-diurnal tide which is independent of the moon's declination; and the other,

$$\frac{k \sin 2\lambda}{4} \cos 2\mu,$$

which expresses the *fortnightly* variation in the *semi-diurnal* tide.

1°. *The Mean Tidal Level.*—The equation of the mean tidal level is, from (12), *mutatis mutandis*,

$$y = \delta + \frac{ka}{8g} \cos 2\lambda (3 \cos 2\mu - 1). \quad (19)$$

This always denotes a “bulge” at the equator, for $3 \cos 2\mu > 1$, because μ lies between 0° and 30° .

The *fortnightly* H. W. occurs when

$$\mu < \begin{matrix} 0^\circ \\ 180^\circ \end{matrix} \text{ or at syzygies.}$$

The *fortnightly* L. W. occurs when

$$\mu < \begin{matrix} 90^\circ \\ 270^\circ \end{matrix}, \text{ or at quadratures.}$$

If $3 \cos 2\mu - 1 = 0$, or $\mu = 35^\circ 16'$, the *mean tidal level* would be undisturbed, and its surface would be a circle, and y would have everywhere its mean value δ .

2°. *The Diurnal Tide.*—The diurnal tide depends on the term

$$f = -\beta \cos m = -k \cos 2\lambda \sin 2\mu \cos m.$$

It vanishes when the moon crosses the equator (as we have already seen, Prop. III.), and at latitude 45° , changing sign at this latitude between the equator and the poles.

Multiplying by dt , and integrating, we find the horizontal velocity of the diurnal tide,

$$u = -\frac{k}{w} \cos 2\lambda \sin 2\mu \sin m; \quad (20)$$

because $u = 0$, when $m = 0$.

Equation (20) denotes a *stationary diurnal tide*, whose head is at 45° latitude, and nodes at the equator and poles.

Fig. (12 a) shows the horizontal motion of the water from $m = 0^\circ$ to $m = 180^\circ$, during which time the water is rising at $+45^\circ$ latitude, and falling at -45° latitude; while

the depth is constant, and the velocity a maximum at the equator and poles (nodes).

Fig. (12 *b*) shows the horizontal motion of the tide

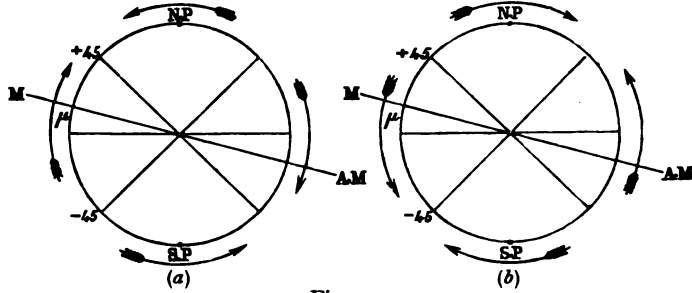


Fig. 13.

from $m = 180^\circ$ to $m = 360^\circ$, during which time the water is falling at $+45^\circ$ latitude, and rising at -45° latitude.

The maximum rise and fall of this diurnal tide at $\pm 45^\circ$ latitude may be found, as before, in the case of the semi-diurnal tide (Prop. III.).

From (20) it appears that the velocity at the equator and poles is

$$u = \pm \frac{k}{\omega} \sin 2\mu \sin m.$$

Multiplying this by δdt , and integrating from $m = 0^\circ$ to $m = 180^\circ$, we find—

$$\text{Quantity of water passing polar and equatorial sections in 12 lunar hours} = \frac{2k\delta \sin 2\mu}{\omega^2}.$$

Equating this, as before, to the volume AHN , Fig. (8), we have,

$$\frac{AH}{2} \times \frac{\pi a}{4} = \frac{2k\delta \sin 2\mu}{\omega^2};$$

and finally,

$$\begin{aligned} \text{Maximum rise and fall of diurnal tide at } \pm 45^\circ \text{ latitude} &= \frac{AH}{2} \\ &= \frac{k\delta}{\pi a \omega^2} \times 8 \sin 2\mu. \end{aligned} \quad (21)$$

But (14), when $\delta = 100$ miles,

$$\frac{k\delta}{\pi a \omega^2} = 4.02 \text{ feet};$$

therefore,

$$\text{Maximum rise and fall of diurnal tide} = 32 \sin 2\mu \text{ feet.} \quad (q. p.)$$

This is a larger tide than any we have yet discussed; for at the maximum declination of the moon it would have a rise and fall of 22 feet.

3°. *The Semi-Diurnal Tide.*—This tide depends on the term (18),

$$f = \frac{k \sin 2\lambda}{2} \cos^2 \mu \cos 2m;$$

which may be written,

$$f = \frac{k \sin 2\lambda}{4} (1 + \cos 2\mu) \cos 2m.$$

The first part of the force is independent of the moon's declination, and has been already discussed (13), on the supposition that the moon was in the equator. Using for the whole expression the method there given, we find, for the horizontal velocity of the semi-diurnal tide,

$$u = \frac{k \sin 2\lambda}{4\omega} (1 + \cos 2\mu) \sin 2m. \quad (22)$$

As $\cos 2\mu$ is always positive, we see that the effect of declination is to increase the tide.

The semi-diurnal tide is *stationary*, having its nodes at $\pm 45^\circ$ latitude, and its head at the equator and poles.

Proceeding as before, we find,

$$\begin{aligned} \text{Maximum rise and fall of semi-diurnal tide } \frac{AH}{2} \\ = \frac{k\delta}{\pi a \omega^2} (1 + \cos 2\mu). \end{aligned} \quad (23)$$

This becomes, when $\delta = 100$ miles,

$$4.02 (1 + \cos 2\mu) \text{ feet;}$$

or, when μ is a maximum,

$$\frac{AH}{2} = 7.03 \text{ feet.}$$

PROPOSITION VII. (PROBLEM.)

It is required to find the laws of tidal motion in an equatorial canal, of constant width and depth, when the moon has any given declination.

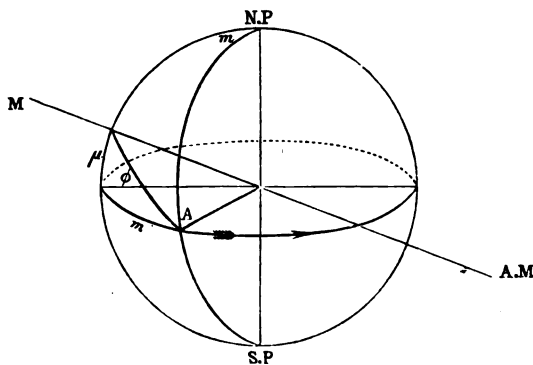


Fig. 14.

From the accompanying Fig. 14, we have, for the disturbing force,

$$f = -k \sin 2\phi \cos u,$$

where u is the angle opposite μ , in the right-angled triangle whose sides are μ, m, ϕ ; or, after some reductions,

$$f = -k \cos^2 \mu \sin 2m,$$

which represents a *semi-diurnal, fortnightly* tide.

which becomes, after a few reductions, and remembering that

$$\cos u = \sin (90^\circ + u);$$

and that

$$\cos \phi = \cos m \cos \mu \cos \lambda + \sin \mu \sin \lambda,$$

where

$$f = -\alpha' \sin m - \beta' \sin 2m, \quad (26)$$

$$\alpha' = k \sin \lambda \sin 2\mu;$$

$$\beta' = k \cos \lambda \cos^2 \mu. \quad (27)$$

These equations denote *diurnal* and *semi-diurnal fortnightly* tides.

1°. *The diurnal fortnightly tide.* This tide is given by the equation

$$f = -k \sin \lambda \sin 2\mu \sin m. \quad (28)$$

Multiplying by dt , and integrating, we find

$$u = \frac{k}{\omega} \sin \lambda \sin 2\mu \cos m + \text{const.} \quad (29)$$

or

$$u = V_0 \cos \lambda + \frac{k}{\omega} \sin \lambda \sin 2\mu \cos m,$$

where V_0 denotes the equatorial velocity.

The velocity is a *maximum* when $m = 0^\circ$, and is a *minimum* when $m = 180^\circ$; therefore we have H. W. under the antimoons, and L. W. under the moons.

To find the equation to the surface of the canal, we have, by substitution from (29) into (16),

$$y \left\{ V_0 \cos \lambda + \frac{k}{\omega} \sin \lambda \sin 2\mu \cos m \right\} = \delta V_0 \cos \lambda;$$

or

$$y = \delta - \frac{k\delta}{\omega^2} \tan \lambda \sin 2\mu \cos m. \quad (30)$$

This equation shows that this diurnal tide tends to become of very great dimensions (unless the water *breaks*),

when λ , the latitude of the circumpolar canal, approaches the pole; for its height depends on $\tan \lambda$. In point of fact, the water will *break*, because the *Equation of Continuity* (16) fails.

2°. *The semi-diurnal fortnightly tide.*

This depends on the term

$$f = -k \cos \lambda \cos^2 \mu \sin 2m.$$

Multiplying by dt , and integrating, we obtain

$$u = \frac{k}{2\omega} \cos \lambda \cos^2 \mu \cos 2m + \text{const.};$$

or,

$$u = V_0 \cos \lambda + \frac{k}{2\omega} \cos \lambda \cos^2 \mu \cos 2m. \quad (31)$$

This gives us for the equation of the surface

$$y = \delta - \frac{k\delta}{2a\omega^2} \cos^2 \mu \cos 2m; \quad (32)$$

therefore, there is L. W. under the moon and antimoon.

PROPOSITION IX. (PROBLEM.)

It is required to solve PROP. III., taking account of friction, regarded as proportional to the relative velocity of the water and of the ground.

[Meridional Canal : Moon in Equator.]

Setting aside the equilibrium surface (or mean tidal level) part of the question, we have, to represent the tangential force (always directed towards the equator)—

$$F = \frac{k \sin 2\lambda}{2} \cos 2m - fu, \quad (33)$$

where f is a coefficient depending on the friction. Re-

placing u by its approximate value (13), we find, for our *first approximation*,

$$F = \frac{k \sin 2\lambda}{2} \cos 2m - \frac{fk \sin 2\lambda}{4\omega} \sin 2m;$$

from which we obtain

$$\int F dt = u = \frac{k \sin 2\lambda}{4\omega} \left(\sin 2m + \frac{f}{2\omega} \cos 2m \right) + \text{const.};$$

or, if

$$u = 0, \text{ when } \sin 2m + \frac{f}{2\omega} \cos 2m = 0,$$

$$u = \frac{k \sin 2\lambda}{4\omega} \left(\sin 2m + \frac{f}{2\omega} \cos 2m \right). \quad (34)$$

This represents (as in Prop. III.) a stationary semi-diurnal tidal wave, whose head is at the equator and the poles, and whose nodes are at 45° Lat.; but the time of H. W. and L. W. no longer corresponds to

$$\tan (2m) = 0,$$

but to

$$\tan 2m = -\frac{f}{2\omega}. \quad (35)$$

The phase of the tide is, therefore, accelerated by friction.

Second approximation.—Substituting in (33) our first approximation for u (34) we obtain, by a fresh integration, our second approximation for u , viz. :—

$$u = \frac{k \sin 2\lambda}{4\omega} \left\{ \left(1 - \left(\frac{f}{2\omega} \right)^2 \right) \sin 2m + \frac{f}{2\omega} \cos 2m \right\}. \quad (36)$$

This gives us a stationary tidal wave, as before; with the time of H. W. and L. W. still further accelerated; viz. :—

$$\tan 2m = \frac{-\frac{f}{2\omega}}{1 - \left(\frac{f}{2\omega} \right)^2}, \quad (37)$$

and so on to any amount of approximation (depending on powers of $\left(\frac{f}{2\omega}\right)$) required.

The rise and fall at the head of the tide (equator and poles) is diminished by friction; for if we write

$$u = \frac{k \sin 2\lambda}{4\omega} \left(\sin 2m + \frac{f}{2\omega} \cos 2m \right)$$

in equations (13) and the following, we find by similar reasoning—

$$\left. \begin{array}{l} \text{Quantity of water flowing through the} \\ \text{Node at } 45^\circ \text{ in 6 lunar hours, . . .} \end{array} \right\} = \frac{k\delta}{4\omega^2} \left(1 - \frac{f}{2\omega} \right).$$

From which we find

$$\left. \begin{array}{l} \text{Rise or fall at head of tide, . . .} \end{array} \right\} = \frac{k\delta}{\pi a \omega^2} \left(1 - \frac{f}{2\omega} \right), \quad (38)$$

and so on, for the higher approximations.

PROPOSITION X. (PROBLEM.)

It is required to solve PROP. IV., taking account of friction, regarded as proportional to the relative velocity of the water and of the ground.

[Equatorial Canal : Moon in Equator.]

In this case we have

$$F = -k \sin 2m - fu.$$

Substituting

$$u = \frac{k}{2\omega} \cos 2m$$

for our first approximation, we find, multiplying by dt and integrating,

$$u = \frac{k}{2\omega} \left(\cos 2m - \frac{f}{2\omega} \sin 2m \right); \quad (39)$$

or, the relative velocity vanishes, not at $m = 45^\circ$, but when $m = 45^\circ + x$,

$$\begin{aligned} \text{or} \quad \cot 2m &= \frac{f}{2\omega} \\ \text{or} \quad \tan 2x &= -\frac{f}{2\omega} \end{aligned} \quad (40)$$

This last equation shows that friction, as in Prop. IX., accelerates the phase of the tide.

The second approximation, conducted as before, would give us

$$u = \frac{k}{2\omega} \left\{ \left(1 - \frac{f^2}{4\omega^2} \right) \cos 2m - \frac{f}{2\omega} \sin 2m \right\}; \quad (41)$$

or, the tidal phases will be all accelerated by an interval x , found from the equation

$$\tan 2x = \frac{-\frac{f}{2\omega}}{1 - \frac{f^2}{4\omega^2}}. \quad (42)$$

This represents an acceleration of phase still greater than our first approximation.

PROPOSITION XI. (PROBLEM.)

It is required to solve the problem of the meridional canal, including friction, when the moon has any declination.

Here we have

$$F = a - \beta \cos m + \gamma \cos 2m - fu \quad (43)$$

(where α , β , γ have the values given in equation (18)). Setting aside α , which affects the mean tidal level, on statical principles, we find, writing for u , its approximate value—

$$u = -\frac{\beta}{\omega} \sin m + \frac{\gamma}{2\omega} \sin 2m;$$

multiplying by dt , and integrating, we obtain

$$u = -\frac{\beta}{\omega} \left(\sin m + \frac{f}{\omega} \cos m \right) + \frac{\gamma}{2\omega} \left(\sin 2m + \frac{f}{2\omega} \cos 2m \right). \quad (44)$$

The diurnal tide has, therefore, its phase accelerated by a time (x), found by

$$\tan x = -\frac{f}{\omega}, \quad (45)$$

and the semidiurnal tide has its phase accelerated by a time (y), found from

$$\tan 2y = -\frac{f}{2\omega}. \quad (46)$$

From this we see that the acceleration of the phase of the diurnal tide, caused by friction, is much greater than that of the semidiurnal tide.

PROPOSITION XII.—(PROBLEM).

It is required to solve the Problem of the circumpolar canal, including friction, when the moon has any declination.

In this case we have (26 and 27)

$$F = -\alpha' \sin m - \beta' \sin 2m - fu;$$

from which, as before, we readily find

$$u = \frac{\alpha'}{\omega} \left(\cos m - \frac{f}{\omega} \sin m \right) + \frac{\beta'}{2\omega} \left(\cos 2m - \frac{f}{2\omega} \sin 2m \right). \quad (47)$$

If m, m' , denote the hour angles, for which the diurnal and semi-diurnal tidal velocities vanish, we have

$$\begin{aligned}\tan m &= \frac{f}{\omega}, \\ \tan m' &= \frac{f}{2\omega}, \\ \tan m &= 2 \tan m' .\end{aligned}$$

From which we find, if z be the difference of accelerations of the two tides caused by friction,

$$\tan z = \frac{\tan m'}{1 + 2 \tan^2 m'} . \quad (48)$$

PROPOSITION XIII. (PROBLEM.)

It is required to find the complete differential equations of motion of an ocean surrounding a solid nucleus, and subject to any disturbing forces (the nucleus itself revolving on a fixed axis); without calculation or transformation of co-ordinates; from simple geometrical and mechanical principles.

According to the self-evident principle of D'Alembert, all problems of Dynamics are reducible to problems of Statics, by introducing velocities and accelerating forces, equal and opposite to the existing velocities and accelerating forces.

Now, the most general equations of equilibrium, of any system, are the following, six in number—

$$\begin{aligned}X &= 0, & Y &= 0, & Z &= 0, \\ L &= 0, & M &= 0, & N &= 0, \end{aligned} \quad (a)$$

where X, Y, Z , are the sums of the external forces resolved along three rectangular axes; and L, M, N , are the sums

of the couples (or twists) of those forces round the axes of X , Y , Z , respectively.

The corresponding dynamical equations are—

$$\begin{aligned} X - \frac{d^2x}{dt^2} &= 0, \\ Y - \frac{d^2y}{dt^2} &= 0, \\ Z - \frac{d^2z}{dt^2} &= 0, \\ L - \frac{d}{dt} \left(z \frac{dy}{dt} - y \frac{dz}{dt} \right) &= 0, \\ M - \frac{d}{dt} \left(x \frac{dz}{dt} - z \frac{dx}{dt} \right) &= 0, \\ N - \frac{d}{dt} \left(y \frac{dx}{dt} - x \frac{dy}{dt} \right) &= 0. \end{aligned} \tag{b}$$

These equations become, in the case of an incompressible fluid—

$$\begin{aligned} \frac{d\rho}{dx} &= X - \frac{d^2x}{dt^2}, \\ \frac{d\rho}{dy} &= Y - \frac{d^2y}{dt^2}, \\ \frac{d\rho}{dz} &= Z - \frac{d^2z}{dt^2}, \end{aligned} \tag{c}$$

where ρ is the common pressure of the fluid (equal in all directions) at any point (x, y, z) .

It will be noted, that the last three equations of (b), depending on couples, disappear; because, in consequence of the mobility of the particles of the fluid, *inter se*, internal couples or twists become impossible.

The Laplacian equations of motion, in polar co-

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θ' or ϕ' is no longer a *force*, but a *couple*, tending to turn the fluid round the centre. Thus,

$\frac{dp}{dr}$ is a *force* acting in the direction of the radius vector;

$\frac{dp}{d\theta}$ is a *couple*, acting always in the moving meridional plane, and whose axis moves perpendicular to that plane;

$\frac{dp}{d\phi}$ is a *couple*, acting always round the axis of rotation, and parallel to the equatorial plane.

It is evident that, if D'Alembert's equations (*b*) are satisfied—

- 1°. For *forces* acting along the radius vector ;
- 2°. For *couples* acting in the meridional plane in every possible position of that plane ;
- 3°. For *couples* acting always round the axis of rotation ;

complete Dynamical Equilibrium will be secured.

We may discount all the mechanical consequences of the rotation by introducing the centrifugal force, leaving only the geometrical consequences of the rotation, in the problem.

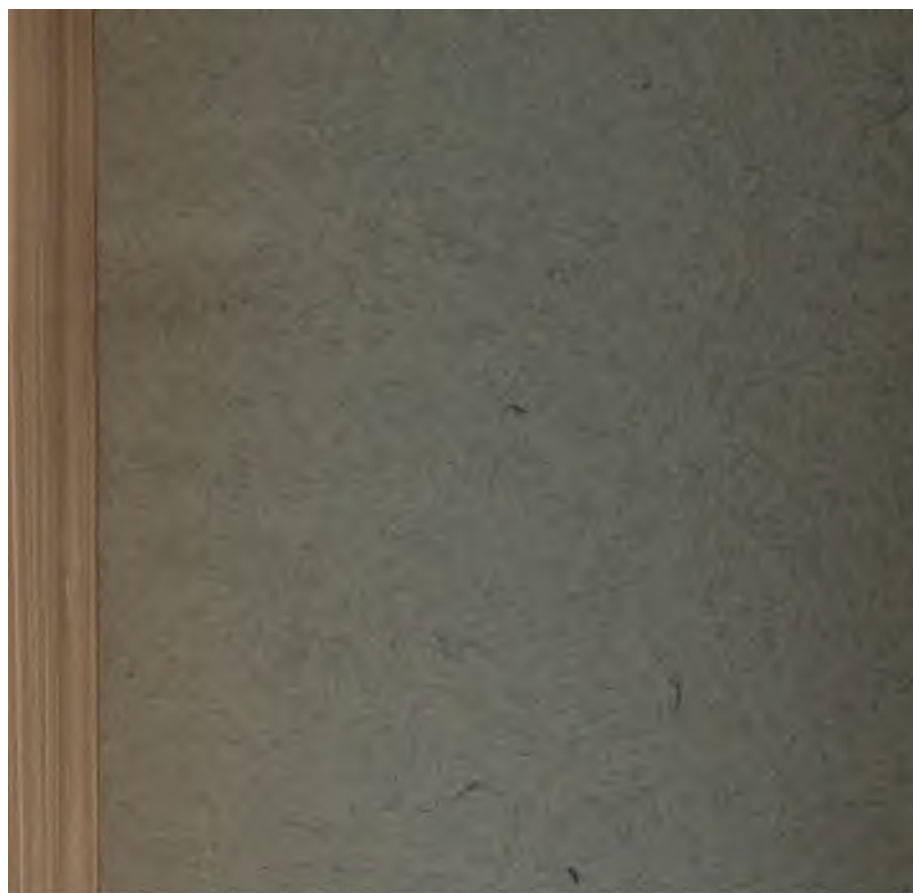
The geometrical effect of the rotation is expressed by writing

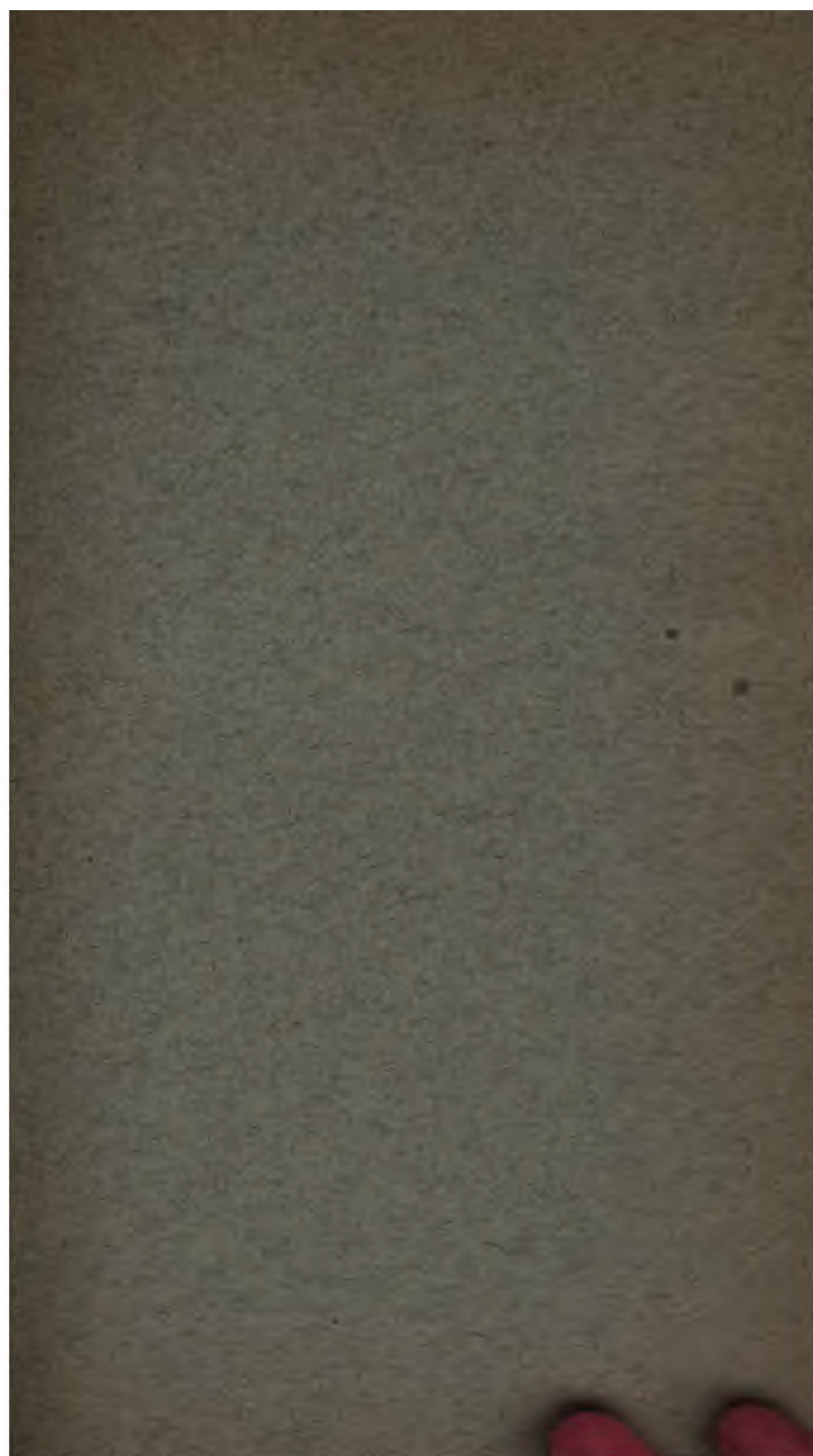
$$\phi' = nt + \phi',$$

where n is the angular velocity of the earth's rotation.

The components of the velocity of any particle along R , S , T , are—

$$\frac{dr}{dt}, \quad r \frac{d\theta}{dt}, \quad r \sin \theta \left(n + \frac{d\phi'}{dt} \right).$$





If we imagine a prism erected on a *trapezoidal* base whose four corners are

$$\begin{array}{ll} (1). \theta', \phi'; & (2). \theta' + d\theta', \phi'; \\ (3). \theta', \phi' + d\phi'; & (4). \theta' + d\theta', \phi' + d\phi'; \end{array}$$

the sides (1, 2) and (3, 4) are equal, and each $r d\theta'$; but the sides (1, 3) and (2, 4) are not equal; the first being $r \sin \theta' d\phi'$ and the second being $r \sin(\theta' + d\theta') d\phi'$, or

$$r (\sin \theta' + \cos \theta' d\theta') d\phi'.$$

If, now, z denote the variable depth of the sea, the quantity of water passing in the time dt through the wall of the prism (1, 2) will be

$$z \times r d\theta' \times r \sin \theta' w dt.$$

The quantity of water passing in the same time through the wall (3, 4) will be

$$\left(z + \frac{dz}{d\phi'} d\phi'\right) \times r d\theta' \times \sin \theta' \left(w + \frac{dw}{d\phi'} d\phi'\right) dt.$$

The difference of these quantities is

$$r^2 \sin \theta' d\theta' dt \left(w \frac{dz}{d\phi'} + z \frac{dw}{d\phi'}\right) d\phi',$$

or,

$$r^2 \sin \theta' d\theta' d\phi' dt \frac{d(wz)}{d\phi'}. \quad (a)$$

The quantity of water flowing in the time dt through the wall (1, 3) is

$$z \times r \sin \theta' d\phi' \times r v dt,$$

and in the same time there passes through the wall (2, 4) the quantity

$$\left(z + \frac{dz}{d\theta'} d\theta'\right) \times r^2 d\phi' dt \times \left(v \sin \theta' + \frac{d(v \sin \theta')}{d\theta'} d\theta'\right).$$

The difference of these quantities is

$$r^2 d\theta' d\phi' dt \left(z \sin \theta' \frac{dv}{d\theta'} + zv \cos \theta' + v \sin \theta' \frac{dz}{d\theta'} \right),$$

which is equivalent to

$$r^2 \sin \theta' d\theta' d\phi' dt \left(\frac{d(vz)}{d\theta'} + vz \cot \theta' \right). \quad (b)$$

The sum of (a) and (b) is the excess of inflow or outflow, in the time dt , through the four walls of the trapezoidal prism. Now, as the bottom of the sea is fixed, and allows no inflow or outflow, the sum of (a) and (b) must be equal to the area of the trapezoid multiplied by the rise or fall of the surface (taken with its proper sign).

This volume will be

$$r^2 \sin \theta' d\theta' d\phi' dt \times u. \quad (c)$$

Hence, adding (a), (b), and (c) together (with a proper sign for u), we obtain

$$u + \frac{d(wz)}{d\phi'} + \frac{d(vz)}{d\theta'} + vz \cot \theta' = 0. \quad (D)$$

This is Laplace's famous Equation of Continuity, and is identical with that given by him (*Méc. Cel.*, vol. i. p. 104), when the notation is changed into his notation.

Equation (D) may be thus written:—

$$u + z \left(\frac{dw}{d\phi'} + \frac{dv}{d\theta'} + v \cot \theta' \right) + \left(w \frac{dz}{d\phi'} + v \frac{dz}{d\theta'} \right) = 0.$$

The second part of this equation vanishes when the sea has a constant depth; in which case the Equation of Continuity reduces to the form

$$u + \delta \left(\frac{dw}{d\phi'} + \frac{dv}{d\theta'} + v \cot \theta' \right) = 0, \quad (D)$$

where δ is the constant depth of the sea.

The centrifugal force affects the directions R, S , only, and does not enter into T .

The centrifugal force in the direction of R is, obviously,

$$\frac{r^2 d\theta'^2}{dt^2} + r^2 \sin^2 \theta' \left(n + \frac{d\phi'}{dt} \right)^2.$$

n

From this, and from the first three equations (b), we find, at sight—

$$\frac{dp}{dr} = R - \frac{d^2 r}{dt^2} + \frac{rd\theta'^2}{dt^2} + r \sin^2 \theta' \left(n + \frac{d\phi'}{dt} \right)^2. \quad (A)$$

The centrifugal force in the direction of S is, obviously,

$$r \sin \theta' \cos \theta' \left(n + \frac{d\phi'}{dt} \right)^2.$$

The sixth of equations (b) therefore becomes, remembering that

$$y' \frac{dx'}{dt} - x' \frac{dy'}{dt} = r^2 \frac{d\theta'}{dt},$$

and equating couples in the meridional plane—

$$\frac{dp}{d\theta'} = Sr - \frac{d}{dt} \left(r^2 \frac{d\theta'}{dt} \right) + r^2 \sin \theta' \cos \theta' \left(n + \frac{d\phi'}{dt} \right)^2. \quad (B)$$

If we now equate the couples in the equatorial plane, we find, since

$$z' \frac{dy'}{dt} - y' \frac{dz'}{dt} = r^2 \sin^2 \theta' \left(n + \frac{d\phi'}{dt} \right),$$

$$\frac{dp}{d\phi'} = Tr \sin \theta' - \frac{d}{dt} \left(r^2 \sin^2 \theta' \left(n + \frac{d\phi'}{dt} \right) \right). \quad (C)$$

The three equations just found from elementary principles are *exact equivalents* of the Laplacian differential equations,